

**S E C O N D**  
**R E P O R T**

FROM THE

**SELECT COMMITTEE**

ON

**ACCIDENTS IN COAL MINES;**

WITH THE

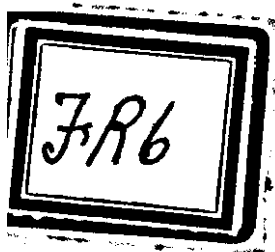
**MINUTES OF EVIDENCE,**

**AND APPENDIX.**

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*Ordered, by The House of Commons, to be Printed,*  
*11 July 1853.*

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*Martis, 31<sup>o</sup> die Maii, 1853.*

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*Ordered, THAT a Select Committee be appointed to inquire into the Causes of the numerous ACCIDENTS IN COAL MINES, with a view of suggesting the best Means for their Prevention.*

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*Jovis, 2<sup>o</sup> die Junii, 1853.*

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Committee nominated of,—

Mr. Hutchins.  
Mr. Fitzroy.  
Mr. Ingham.  
Mr. Hussey Vivian.  
Mr. Baird.  
Mr. Cumming Bruce.  
Mr. Cayley.  
Colonel Pennant.

Mr. Stephenson.  
Mr. Mostyn.  
Viscount Goderich.  
Mr. Farrer.  
Mr. Child.  
Mr. Henry Austin Bruce.  
Mr. Cobbett.

*Ordered, THAT the Committee have power to send for Persons, Papers, and Records.*

*Ordered, THAT Five be the Quorum of the Committee.*

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*Jovis, 9<sup>o</sup> die Junii, 1853.*

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*Ordered, THAT Viscount Goderich be discharged from further attendance on the Committee, and that Mr. Locke be added thereto.*

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*Lunæ, 27<sup>o</sup> die Junii, 1853.*

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*Ordered, THAT the Committee have power to Report the Minutes of Evidence taken before them from time to time to The House.*

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S E C O N D   R E P O R T .

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THE SELECT COMMITTEE appointed to inquire into the Causes of the numerous ACCIDENTS in COAL MINES, with a view of suggesting the best Means for their Prevention, and who were empowered to Report from time-to time to The House,—

**H**AVE made further progress in the Matters to them referred, and have agreed to Report the Minutes of Evidence taken before them.

11 *July* 1853.

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## MINUTES OF EVIDENCE.

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*Jovis, 30<sup>o</sup> die Junii, 1853.*

MEMBERS PRESENT.

Mr. Hutchins.  
Mr. Cayley.  
Mr. Cobbett.  
Mr. Child.  
Mr. Locke.

Mr. Stephenson.  
Mr. Mostyn.  
Mr. Fitzroy.  
Mr. Hussey Vivian.

E. J. HUTCHINS, Esq., IN THE CHAIR.

Mr. *Martin Jude*, called in; and further Examined

1844. Mr. *Cobbett*.] WHO is the principal man, or manager in a mine; what do you call him in your part of the country?—Head viewer.

*Mr. M. Jude.*

1845. How many are there in a mine?—After the head viewer, there is an under viewer.

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1846. And the next man is an overman?—Yes.

1847. How many overmen are there in a mine generally?—One fore overman, and one back overman.

1848. What are the next people?—The deputies come in next, deputy overmen.

1849. How many of those are there?—The number ranges according to the size of the pit, three or four, five or six sometimes.

1850. What are the next men?—Those are all the officers that carry on the works of a colliery.

1851. Are there any waste men?—Yes.

1852. What are the waste men?—They attend to the ventilation part.

1853. Those are the persons then who have to manage the ventilation?—Chiefly.

1854. How many of those are generally in a mine?—They have been very much reduced lately; there are very few collieries that have more than two or three in each pit.

1855. Are they in number according to the size of the pit?—I think that would be so, and the nature of the seam of coal.

1856. Do you know how many there are according to the quantity of coal raised in a pit?—I cannot say whether there is any principle of that kind acted on or not; I think it will be according to the fiery nature of the seam.

1857. Are there men called firemen?—They are known by that term in Lancashire and other counties, but not in Northumberland and Durham.

1858. Have you described the principal men in the pit?—Yes.

1859. What are the next, the working people?—Coal hewers.

1860. Those are the people who get the coal?—Yes.

1861. What are the next?—The putters.

1862. The hewers and putters are working people?—Yes.

1863. Are there others to take care of the road?—Yes, there are some parties appointed for that purpose; one or two in each pit, according to the size and dimensions.

1864. You said the last time the Committee met, that what was wanted principally was ventilation, and that every man should have a certain quantity of air supplied to him?—Yes; I should have said a sufficient quantity.

1865. You did not say how much?—No, I could not mention that exactly.

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1866. Your

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1866. Your opinion is, that inspection is the principal mode by which the working men could be seen to have the sufficient quantity of air that you speak of?—Yes, I am fully persuaded that a proper system of inspection will ensure that.

1867. You spoke of an inspector visiting the men once a month?—Yes.

1868. By visiting once a month, could the inspector ascertain how far the men had been supplied, between the time he visited the mine and his last visit, with a sufficient quantity of air?—No, he could not ascertain as to any particular deficiency that might ensue in that period.

1869. Must it not be known then by inquiry of the persons who had been working during that time?—Quite so.

1870. So that the inspector would be the person to whom the working miner would have to complain, if he had complaints to make?—Yes.

1871. You said something in your last examination about the miners being afraid to make complaints, did you not?—Yes.

1872. Of whom would he be afraid?—He is afraid of losing his employment from that colliery.

1873. From what person?—The head viewer.

1874. In point of fact, do you consider inspection a matter of great importance as an appeal for the working men?—Yes; but I consider it of greater importance that working men should be attended to without those appeals being made. Intimidation still hangs over him, as the inspector would generally be accompanied by the overman or the under-viewer when making his visits, consequently he durst not speak, in their presence what he ought to have said to the inspector individually.

1875. Mr. Locke.] Then, I understand you rather to suggest, that it would be better to have this inspection made by the owners of the collieries than by a Government inspector?—No.

1876. How would you remedy the present defect, namely, of intimidation and fear, if the inspector continues to go with the overman through the pit?—I can hardly prescribe any remedy for that; it always will get out, some way or other, the fact of his having communicated to the inspector.

1877. If you want to have good ventilation in a mine, and you want to have the workmen protected, could that be done by any means by the owners of the collieries themselves, so as to prevent a man being subject to the suspicion of having communicated to the inspector?—I cannot see how he can escape being suspected, for I know a case or two which illustrate that very strongly. At one colliery in the county of Durham, near Newcastle, I was informed by one person that his district of the pit was very badly ventilated, and dangerous. He informed the inspector, and the inspector communicated to the head viewer, a few days afterwards, that he would be there to visit it on a certain day some days hence. He went, but previous to his going, eight or ten men were set to work to remedy this defect in the ventilation, and the man who gave the information to me informed me afterwards, that all the brattices were taken from the district he worked in to another part of the pit, and efficiently ventilated that part, and that man had to leave the colliery subsequently, although no names were ever given up.

1878. Do you attribute that entirely to the fact of his having made that communication to you?—I think they had got a suspicion that he was the man. They did not send him away from the colliery; they take another plan; they give a man less wages for working; they have many means at their command if they have a strong suspicion of a man.

1879. Is it your opinion that that man was discharged for communicating that fact?—I would not like to say that.

1880. What do you mean by giving that evidence to this Committee, if you do not mean it to have some effect; you gave it as an illustration of intimidation?—The man himself gave it to me as his opinion, that he was suspected of giving that information to me.

1881. Had the man himself any means of ascertaining the truth of that suspicion of his own, from the facts which came to his knowledge?—Only by the behaviour of the overmen and the under agents towards him.

1882. Are you aware whether he was ever charged with having made such a communication to the inspector?—Never.

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1883. Mr. *H. Vivian*.] How long had he been at work in the pit?—I think three or four years in that colliery.

1884. Mr. *Locke*.] How long did he continue to work afterwards?—A few months.

1885. Mr. *H. Vivian*.] What aged man was he?—About 30 to 35.

1886. Are you aware how many collieries he had been in before?—I cannot say precisely, but several I know of.

1887. He might have been considered, perhaps, as rather a wandering man than a steady workman attached to the colliery?—He does not come under that term; generally speaking, in the north, he comes under the term of a steady hard-working man, anxious to get on, and well liked by the generality of his masters.

1888. It is generally well known to viewers what men in each pit are inclined to raise difficulties, and what men are not?—Yes.

1889. And when they find difficulties of various kinds arise they are very apt to pick out those men who they think have been at the bottom of these disturbances, or these combinations of men, and so forth?—Yes.

1890. Were there other men at the same time that were offered less wages than they might consider they were fairly entitled to?—At that colliery there was no combination existing.

1891. I am not asking that; I am asking whether there were other men who might not have been placed in the same position as regards wages at that colliery?—No.

1892. You are positive that in that colliery there were no other men who were placed in the same position?—No other men.

1893. How many men were there?—One hundred and twenty, or thereabouts.

1894. You can undertake to say that no other man was called on to do any different description of work from that which he had been hitherto doing?—No.

1895. You can say out of 150 men no other man was changed?—No other man.

1896. Mr. *Locke*.] Where was that?—I would not like to specify, unless it was necessary. There are several cases continually occurring of the same description.

1897. *Chairman*.] Have you any objection to give the name of the colliery?—No particular objection.

1898. Then give the name?—Unsworth.

1899. Mr. *Locke*.] How long ago is it?—Verging on two years.

1900. Mr. *Child*.] Was this man directly discharged, or did he leave in consequence of his wages being lowered?—No, he left; he was not discharged.

1901. Mr. *H. Vivian*.] Were his wages lowered, or was it required of him to work in a district where he would not get so much wages?—That was just it.

1902. You are quite certain no other man out of the 150 was placed in the same condition?—No.

1903. Mr. *Child*.] Were no men working in the same department that he was working in changed at the same time?—None.

1904. Mr. *Locke*.] I understand you to say, that you think that, as one of the means of increasing the security of mines, there should be increased superintendence?—Yes.

1905. I understand you also to say, that that superintendence should be on the part of Government?—Yes.

1906. And I understand you also to say, that you did not think that extra Government superintendence would remove the difficulty which you have just now expressed about intimidation and fear of the workmen?—I think it would not.

1907. Then how would you lessen that difficulty of intimidation and fear on the part of the workmen; supposing you wanted to satisfy the mind of the workman that everything was done for him that could be done, what means would you suggest for the purpose of satisfying that large body of men?—I think that an efficient inspection would prevent the men from having to make any complaints whatever, and frequent visits of the inspectors would insure that the master must keep these pits in tolerable good order, or be visited by certain pains and penalties which the inspector should be empowered to inflict.

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and that would prevent the men having to make any appeals, and remove the cause of intimidation.

1908. That answer is rather different to a former one; I understood you to say, that increased inspection would not get rid of the intimidation and fear of the workmen; now I understand you to say, that you think that increased inspection would be so beneficial in its operation, as to render any complaints on the part of the workmen unnecessary?—I do think so.

1909. You think that increased inspection would so infuse energy into the viewers and persons connected with the ventilation as would ensure effective ventilation?—Yes.

1910. And render the complaints of the workmen less numerous, and perhaps destroy them altogether?—Yes.

1911. Now you said that the number of waste men had been considerably reduced of late?—Yes.

1912. Why have they been reduced of late?—I think it is owing to the introduction of the Davy lamp, or safety-lamps.

1913. That has been a long time introduced; when you said there had been a reduction in the number of waste men, during what number of years do you speak?—Previous to the introduction of the Davy lamp.

1914. Had you any experience in mines before the introduction of the Davy lamp?—I was just a boy, working at playing the steel mills, when the Davy lamp was introduced.

1915. When you said that the number of workmen had been reduced, you meant that they had been reduced since the introduction of the Davy lamp?—Yes.

1916. Do you suppose they have been reduced during the last five years?—I think not.

1917. *Chairman.*] You stated in your examination of the other day, that it was possible, provided you could have confidence in the inspector, that the workmen should communicate to you, and you should communicate to the inspector, that the works were in a dangerous state?—Yes.

1918. Do you adhere to that opinion?—Yes.

1919. Do you not think that the workmen would have greater confidence in an inspector than if a set of sub-inspectors were appointed?—The higher in standing and the higher in life the gentleman was who was appointed to inspect the mines, the greater confidence the workmen and yourself would have in him, that he would not betray any confidence you might impose on him?—I believe the workmen would have less confidence in a man who was not of their own class; a practical mining engineer.

1920. Suppose practical mining engineers could be found of the grade of the present inspectors, do you think an increased number of them would satisfy the workmen?—It would depend entirely upon their conduct.

1921. Do the present inspectors satisfy the workman?—The inspector for the north district does not.

1922. What is his name?—Matthias Dunn.

1923. In what respect does he fail to satisfy the workmen?—The principal reason they have is, that he sends word or gives notice to the owners when there is any complaint made, a few days before he comes to pay the visit.

1924. Does he at the same time name the parties who made the complaint? No, I think not.

1925. Your objection is, that the owner of the coal mine has sufficient time to put the mine in order before the inspector's visit?—Yes.

1926. Not that the confidence that the workmen repose in the inspector is betrayed?—No; it is rather the mode in which it is done.

1927. You are now alluding to a different subject; the point on which I wished to have your opinion was this, what description of inspectors would satisfy the workmen, and give them confidence in making the complaints to you, and you to the inspector, that their confidence should not be betrayed by the inspector?—I could not specify any particular description of persons who would give the most confidence, excepting that I think the workmen would much rather that they should be practical mining engineers.

1928. Do the workmen think Mr. Matthias Dunn a competent person to inspect mines?—Quite competent.

1929. They think him a scientific and practical mining engineer?—Yes.

1930. Mr.



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1930. Mr. *Locke*.] That meets the view you expressed before, as to the qualifications that the miners would be satisfied with?—Yes.

1931. Your objection to Mr. Matthias Dunn is simply that he communicates with the master of the colliery before he makes his inspection?—Quite so.

1932. In any other respect do the miners in the north of England raise any objections to Mr. Matthias Dunn's qualifications?—None at all.

1933. *Chairman*.] Do they not believe that Mr. Dunn's visits have always been beneficial, and that the mines have been put in good order after he has inspected, or in better order?—They have generally been so; they have expressed an opinion that there has been much good done by the inspector's visits, but they are so few and far between, that the pit lapses into the original condition before long.

1934. Do you think the workmen would rather have the number of the inspectors of the present kind increased than have a class of men under them, and, of course, inferior to them?—I think they would prefer having sub-inspectors. They have expressed so in their petition to the House several times.

1935. Have you ever heard men state their reasons for coming to that opinion?—The principal reason that I have noticed is, that the sub-inspector being a young man, would be able to travel round into all the nooks and crevices, and find gas out if it was possible to be found.

1936. You state that you wish that a sub-inspector should visit each mine in the north of England, in your district, once a month?—Yes.

1937. Can you give the Committee any idea how many sub-inspectors it would take to perform that duty under the inspector?—About seven or eight.

1938. Are you speaking of the whole district over which Mr. Dunn presides?—Northumberland and Durham; eight sub-inspectors would be sufficient, under the control of Mr. Matthias Dunn, or any other chief inspector.

1939. Mr. *Locke*.] Are you now giving your own individual opinion, or your opinion as gathered from the wishes of the workmen?—My individual opinion is so, and many of the workmen have expressed themselves to me to that purport.

1940. At the same time, have any of those workmen expressed to you what their notion would be of the qualifications of the sub-inspectors?—Yes, they have done so frequently.

1941. Now, what is their notion of the qualifications of a sub-inspector?—Some of the most intelligent of the miners themselves.

1942. Then the miners think that the sub-inspectors should be taken from the class of practical miners?—Yes.

1943. Young intelligent men who have been working in the collieries themselves?—Yes.

1944. And consequently would know where those nooks and crevices were best to be met with?—Just that.

1945. Are you of opinion that the miners in the north would greatly prefer a sub-inspector from that class, than from the class of young men brought from school or college, who had no previous knowledge of mining?—They would very much prefer the former.

1946. *Chairman*.] Is it your own opinion that the owners and proprietors, and head viewers of coal mines, would have equal confidence in such a sub-inspector as the men you have described the workmen to prefer?—I believe young intelligent men could be found in the collieries who would have both the respect and confidence of the owners and workmen.

1947. Mr. *Cobbett*.] The Act which created the inspectors was passed in 1850?—Yes.

1948. You had no inspectors before?—No.

1949. Are the working people, so far as you know them, better satisfied with their state since the inspectors were created, or before; has it done good?—It has not given general satisfaction.

1950. The inspectors have not?—No.

1951. Have they done no good?—The good is so small, that it has not given general satisfaction.

1952. Still you are in favour of Government inspection?—Yes.

1953. Your only complaint is, that the inspection at present in existence is not perfect enough?—Not sufficiently extensive.

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1954. *Chairman.*] The number is not adequate?—No.

1955. Mr. *Cobbett.*] Does that arise from the fact that the number of inspectors is not large enough?—Entirely.

1956. So far as those inspectors have been able to inspect mines, they have given satisfaction?—Yes, at each of the different severe explosions; Washington, Killingworth, Hepburn, since the inspectors were appointed; the inspector's report states that there was an inadequate supply of air.

1957. And other mismanagement which led to those misfortunes and loss of life?—The men were perfectly satisfied with these reports; and there was an improvement immediately, after these lives were lost, in the conditions of these pits, but the inspectors cannot go back again for a length of time; the pits are worked on to the verge of danger, from want of proper and frequent inspection.

1958. Now, in saying what you have just said, do you consider that you are speaking the sentiments of the body of the working people in mines?—Yes.

1959. What means have you of knowing their sentiments?—We have a general communication; I am secretary of the Mining Association.

1960. How long have you been their secretary?—About ten years.

1961. Before that time you were a working miner?—Yes.

1962. *Chairman.*] Are their meetings connected with the association?—Yes.

1963. How often do they meet?—They meet once a month, by delegates.

1964. How many delegates are appointed for each number of men?—One from each colliery, principally.

1965. Those are selected by the miners themselves?—Yes.

1966. Are they generally the most intelligent of that class of men?—Invariably so.

1967. Mr. *Locke.*] Do you think that the working men would contribute anything towards the expense of these sub-inspectors if they had some little power in the nomination of them?—I think they would.

1968. Did it ever enter your mind to consider any proposition of that kind, namely, that the men should have some power in the nomination of the sub-inspectors, and that they should also contribute a part of the expense?—As regards the expense, that never did enter my mind, but the other has frequently passed through my mind.

1969. That is, the question of appointment?—Yes, and we have more than once got several parties to give adherence that Mr. Matthias Dunn should be the inspector of the whole district.

1970. *Chairman.*] You stated, in the commencement of your evidence, that the miners wished this Report of the Select Committee of 1852 to be carried out; do you mean that they wished every part of the Report to be carried out?—I believe they specify so in their petition.

1971. Do they agree about what are called refuge-stalls?—They do not understand that particularly.

1972. In your evidence, as on the notes, it says that the miners and yourself wish the whole of the Report of 1852 to be carried out; first of all, with regard to refuge stalls, do you think these refuge-stalls would be of any use to the miner to guard him from after-damp in the case of explosion?—I have not had an opportunity of examining that practically, or otherwise.

1973. Can you conceive it possible to carry air to these refuge-stalls in any way, so as to make them available to the workmen to stay in for any length of time, provided the pit was to become full of foul air?—There is a possibility.

1974. Describe how it could be done?—By placing proper valves, and making them air-tight.

1975. How would you get the air to the stall at all when the communication was cut off by the stoppings and doors, or other things being blown away?—The air is already supposed to be in the stall, and the miner enters there and breathes this as long as it lasts, till fresh air is brought to him.

1976. You would merely have these refuge-stalls filled with air, and closed with a valve that would render it air-tight, and the miner entering there would merely have to breathe the air that is in the stall at the time he entered it?—Yes.

1977. When that was exhausted, he would be deficient of air, and die?—Yes.

1978. What

1978. What size should these stalls be, supposing there were 30 or 40 men in them?—It would take an immense size for that number of men.

1979. You would keep the refuge-stall open at all times, so that a current of air could go through it at all times, except in case of explosion, when the valve would be shut down, and make it air-tight?—Yes.

1980. Looking at the question as a practical man, and a man acquainted with collieries, do you think it feasible or practicable that a number of men could support life for any length of time in these refuge-stalls?—It would depend entirely on the number of men, and the largeness of the stall, and the stall being filled with a sufficient quantity of air.

1981. You cannot state to the Committee what area of air would support a man for any given length of time?—No; I cannot.

1982. You have not looked into that?—No.

1983. Nor the miners themselves?—No.

1984. With regard to bore-holes of goaves, do you think it feasible, in your Northumberland pits, to bore down on a goaf, and clear the air beyond these bore-holes?—I think it is practicable to bore holes into the goaf.

1985. Do you think they would not be downcasts?—I cannot tell that.

1986. Do you not think, if you were to bore a hole down into the pit, and the furnace was drawing into the pit, they would be down-casts?—It is more than probable it would be so.

1987. Would not water go down with them?—It is probable it would.

1988. Would not there be a difficulty in keeping them open?—A great difficulty.

1989. Are these bore-holes a plan that you, as a practical man, would recommend for clearing these goaves of foul air?—No, I would not recommend them.

1990. Then I suppose we may take your answer; with regard to this Report of 1852, to be that the workmen merely mean the general principles recommended by the Committee to be carried out?—Entirely so; I think they embodied the chief of them in the petition.

1991. Mr. *Loche*.] There is one in this petition, in which they pray that the qualifications of the managers and officers of mines shall be inquired into by some proper tribunal?—Yes.

1992. That, I see, is made a strong point of in this petition?—Yes.

1993. Can you suggest to this Committee who you would appoint for the purpose of making the examination as to the fitness of the officers of mines?—I think a Board might be formed of three or four of the principal mining engineers of the country.

1994. From your experience, how would you propose or recommend to this Committee that a Board should be formed for the purpose of examining into the qualifications of the officers for managing collieries?—Three or four of these principal mining engineers might form such a Board for examining them; a proper tribunal for examining them should be established.

1995. Would that be satisfactory to the miners?—I think it would.

1996. *Chairman*.] Would they prefer a Board of that kind to any Government Board?—Yes.

1997. Would you have all the officers of a colliery so appointed?—Yes.

1998. Generally speaking, from your own experience, do you think that the officers of a colliery now in the management of mines are deficient of the qualifications that are requisite?—Generally so.

1999. Taking the principal viewer, what you call the chief viewer, are they not generally a superior class of men in the north of England?—They are indeed.

2000. Perhaps superior to almost any viewers in any other part of the kingdom?—I cannot state that.

2001. You do not know of your own knowledge any class of men in mining, in any other parts of the country, superior to them in intelligence and experience?—I do not.

2002. What you call the under viewer, or the managing viewer, are they generally of the same class, or are they deficient in the proper qualifications?—They are of a different class, because the head viewers all serve their time or apprenticeship to the trade, and none are allowed to be head viewers except they go through this process. The under viewers are taken from the most intel-

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ligent of the workmen; probably those who have gone through all the stages from a deputy and overman to an under viewer.

2003. From your own experience as connected with the workmen, what is your opinion generally, without specifying individuals, of the qualifications and fitness of the general class of under viewers?—Many of them are very good and well qualified; others are not so.

2004. You said, if I understood your answer to a former question, that you should prefer these sub-inspectors to be taken from young men in the mines who have had some previous knowledge of mining operations?—Yes; ten years at least.

2005. Supposing that that be a good qualification for a sub-inspector, one may reasonably conclude that it is a good qualification, or a good experience for an under viewer?—So it is.

2006. Still I understand you to say that, notwithstanding that previous experience, you do not find the under viewers are so intelligent and fit as you think they should be?—Not generally so.

2007. You say there are some, in your judgment, unfit for it?—Quite unfit.

2008. Can you give the Committee any means of judging how that unfitness arises; if they have had the experience, in what way are they unfit for this position?—Many of them do not attend to their duties; they drink with the overmen and deputies, and, when the under viewer drinks, all the others must follow, as a matter of course.

2009. It is a sort of moral unfitness?—Yes.

2010. Is that extensive in the north of England?—Not very.

2011. Has it decreased or increased of late years?—Decreased very much.

2012. Is it decreasing still?—I think so.

2013. Now, going from the under viewers to the overmen, are the overmen, in your opinion, a well qualified class of men?—Not generally so.

2014. How are they; what school are they taken from?—Generally in the stage of progress as deputies.

2015. From the mining body?—Yes.

2016. The most intelligent miners?—Not the most intelligent.

2017. They are taken from miners?—Yes.

2018. Perhaps your complaint is, that they are not taken from the most intelligent class?—Yes.

2019. Do you think that is a school from which overmen should be taken; namely, from the most intelligent of the workmen themselves?—Yes.

2020. Can you point out any mode by which that system of inspection and promotion could be best promoted?—The only mode I can point out is, by schools for teaching mining theoretically; through schools, in addition to their own practical information.

2021. In the north of England, at this moment, are there schools generally established at collieries?—Yes, generally there are.

2022. Are there any principal collieries, in point of fact, without schools?—I think not.

2023. What do they teach generally at those schools?—Reading, writing and arithmetic.

2024. Anything more?—Not much more, generally; there are some which teach mensuration, and the higher branches of mathematics.

2025. Are there any other subjects which you think it would be desirable to teach in those schools; I mean in educating men fit to manage collieries?—I think part of the education should consist in making them understand how to manage collieries, the nature of the gases and airways, and plans of colliery workings, and all such things, that appertain to the safe management of a pit.

2026. It would not be a very difficult thing to ingraft that extra teaching on the schools which are now established?—They would perhaps be too small for that purpose.

2027. Do you see any difficulty, in reference to the teachers themselves?—Many of the teachers, or all of them, have not been practical miners, nor do they understand mining at all generally.

2028. Then you think it would require an entirely new teacher from those who are now employed?—Yes.

2029. How are those schools now supported?—By the miners themselves.

2030. Are

2030. Are they, in your opinion, sufficient for the objects sought; namely, the education they profess to give?—Not by a great deal.

2031. You think there is a deficiency in the means of education among the mining classes?—A great deficiency.

2032. And you would wish it to be extended to practical mining operations?—Yes.

2033. *Chairman.*] Looking at the last five or six years, is it your opinion that the children of miners are improved in their education or not?—I think they have, on the whole.

2034. At each colliery in Northumberland and Durham is there a school?—I believe at every one, or nearly so; I cannot say for one particular exception or two.

2035. When you say that the men support the schools themselves, do you mean that they pay so much in the pound from their earnings, or that they pay so much a week to the master of the school themselves?—No; they pay to the master themselves.

2036. By voluntary contributions?—So much per child.

2037. Do you think the miners would agree to a rate, to paying so much in the pound, which should be stopped from their earnings, for the purpose of education?—They would, if they had some power attached, to see if it was rightly distributed.

2038. Provided they had a committee appointed to see that the master was a proper and efficient man, you conceive they would have no objection to schools being established on that principle?—I think not.

2039. And to teach mining?—To teach mining.

2040. If it was an increased expense to teach the children practical mining, you do not think they would object to pay a little more increased cost for that purpose?—I believe they would not.

2041. When you say practical mining, let the Committee understand what you mean; by teaching them practical mining, do you mean the science of mining?—Yes.

2042. You do not mean the practice of mining, but the science of mining?—Yes.

2043. Therefore a master could be found, who was not a working man, who would be efficiently competent to teach them the principles of mining and ventilation, and everything connected with the science of mining; is that so?—Yes.

2044. What rate could such a master be obtained at?—I think he should have eighty or one hundred pounds a year.

2045. Would you recommend it to be embodied in the Act of Parliament, that it should be compulsory on each colliery to have a school, and that those schools should be paid for in the manner they have now designated?—I think it would take very well with the colliers.

2046. Do you think there would be no objection to allowing a certain percentage of their earnings to be stopped from them, for the purpose of education?—They would be quite willing, under the circumstances I have described.

2047. Those circumstances being, that they should have some control in the management themselves?—Yes.

2048. *Mr. Locke.*] Would it be a desirable thing, that at each of those collieries there should be a map of the colliery placed in the school room?—No; but a general map, showing the principles of ventilation, might be adopted.

2049. A general map would be better than a map of the particular colliery?—Yes.

2050. Are maps essential in carrying on a colliery?—Quite so.

2051. Do you see any objection in its being placed in the school-room for examination?—I could only conceive that the owners would object to it.

2052. The workmen would not?—No.

2053. *Mr. Stephenson.*] At the schools which you now have amongst the collieries in the north of England, you say they generally teach reading, writing and arithmetic?—Yes.

2054. At what age do the boys generally leave the schools?—About nine or ten at present.

2055. Do you think that if the master was a scientific miner, that he could convey to a boy's mind at eight or nine years of age any important information

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respecting mining?—I think a good impression would be made at that time on their minds before they went to work.

2055. Do you think that would be a better preparation at that school, than having a school of mining at which they could attend whilst they were working under ground, and gaining practical information?—I think it would be necessary to continue it by night schools.

2057. Would you not rather leave the schools as they are now for the boys, to add to the present system a mining school, which might be accessible either by night or by day, for those who are workmen in the mines?—I think the other might be employed to induce a notion on the part of the boys to go to these night schools, for without that they would not have that notion.

2058. *Chairman.*] How many hours do the boys work now in the pit?—Twelve hours.

2059. Do you think that is too much?—Rather too much.

2060. Can you state the earliest age a boy ought to go to a pit at all?—Not before 14.

2061. How long do you think he ought to work at the pit, provided he goes at 14 years of age?—About eight hours.

2062. Is your evidence now with reference to his physical powers, or with reference to the means he should have, after he leaves employment, of educating himself by these night schools?—I think both of them are enjoined.

2063. Is it your opinion that a law should be enacted prohibiting boys of certain ages working more than a certain number of hours?—Yes, I should like that law very much.

2064. Just explain to the Committee what you think would be the right law?—I think that there should be two shifts of boys instead of one. They are 12 hours at work, and, before they get home and get washed, two more are consumed, which necessarily keeps them 14 hours from home. If there were two shifts of boys employed, they might work six or eight hours each, from 10 years of age to 14, for the law at present is that they must be 10 before they can go down to the pit.

2065. Do you not think that a law of that kind would have the effect of diminishing their wages; do you think the coal proprietor would be willing to pay the same sum for working eight hours as for 12 hours?—No.

2066. Do you think it beneficial to the boy that his wages should be diminished, and that he should only be allowed to work a certain number of hours?—Yes, in order that, after he had done his work, he should have his energies and faculties in full force to imbibe any education that might be offered to him.

2067. *Mr. Child.*] Would the parents be satisfied that their children should only be allowed to work a short period and have their wages diminished?—Many would not, but the great body would be satisfied with it.

2068. *Mr. H. Vivian.*] Assuming that an efficient school was attached to each colliery, do you think that any regulation could be made that boys should not be employed who had not attended that school, in order to produce a strong moral effect as to the necessity of educating the children?—Yes; it would have a great effect in keeping them at school.

2069. *Mr. Locke.*] In point of fact, you would require, in that case, a certificate that he had been at school before he was permitted to go to the mine at all?—Yes.

2070. Did I understand your opinion as to the employment of boys to be, that you would by law enact that between the ages of 10 and 14 no boy employed at the colliery should be permitted to work more than eight hours a day?—Just so.

2071. After 14, you would not have any restriction; you would leave that as a matter of arrangement between the boys, the parents, and the owners?—Yes.

2072. Your restriction would be limited from 10 to 14?—Yes.

2073. Up to 10, you would not allow any boy to be employed at all?—No.

2074. Up to 14, your own opinion is, that they should not be allowed to go into the pit?—As the present law is 10, they should work half shifts, from 10 to 14, and thus insure a better education among them.

2075. *Mr. H. Vivian.*] The purport of your evidence has rather been, that neglect

neglect occurs on the part of the owners of collieries?—Or their managers, chiefly.

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2076. Are you aware of the expense which an explosion puts the colliery owner to?—I am aware it is very great.

2077. What should you conceive the expense of such an explosion as the Killingworth or Hepburn?—Three or four hundred pounds.

2078. Does it not happen that when an explosion takes place, the stoppings, main doors, brattices, and frequently the guides in the pits, are all shattered and broken to atoms?—Yes.

2079. Do you conceive they could be replaced for two or three hundred pounds?—In those collieries you speak of that was not the case. It was only in one district of the pit, and that a very limited one, where an explosion took place, and a few doors and brattices were broken; and thus little expense incurred.

2080. As a general rule, we may assume that an explosion is an exceedingly expensive thing to the proprietor of the pit?—Yes.

2081. It is also very true, is it not, that great distrust arises in the minds of workmen, and the effective working of the colliery is stopped for some time after the explosion?—Very frequently so.

2082. So that great loss arises from the non-production of coal?—Yes.

2083. Therefore is it not vastly to the interest of the proprietor of the mine that the mine should be kept in an efficiently ventilated state?—Yes, it is entirely to his advantage.

2084. Then to what do you attribute the neglected state of the mines in the north of England?—I think it is from false economy.

2085. Mr. Child.] Would not workmen be disposed to work for less wages in mines which are notoriously well ventilated, than in mines that are the contrary?—Yes.

2086. Mr. H. Vivian.] Do you conceive it possible to put a fiery pit in such a condition that it should be absolutely safe?—Yes.

2087. As regards wilful neglect on the part of men, do you conceive that it would be desirable that specific enactments should be made against wilful neglect on the part of men?—Yes.

2088. Have you ever known cases in which men have been guilty of smoking in fiery mines?—Not where it was prohibited.

2089. You have never known a case, where smoking was prohibited, where smoking took place in the pit?—Never.

2090. Have you ever known a case of a man unscrewing his lamp?—Not where it was prohibited.

2091. Do you think it would be very desirable that specific enactments should be made against wilful neglect on the part of the men?—Quite so.

2092. Chairman.] In your opinion, it is as highly important to guard the mine from accidents arising from the carelessness of the workmen, as it is from inefficient ventilation, and want of attention on the part of the viewers?—Most certainly.

2093. Mr. Stephenson.] You just now, in reply to a question, stated that you thought that all fiery pits might be easily made safe by careful ventilation?—Yes.

2094. Is it not a prevailing opinion among the best informed miners as well as viewers in the north of England, that sometimes a discharge of gas is very large and sudden?—Yes, there have been such cases reported, and undoubtedly they were so.

2095. In those cases, ventilation might prove inefficient for a time?—Yes; if the ventilation was weak, and only sufficient to keep the mine at a safe point, then any extra amount of gas coming out would ensure an explosion, or make the pit dangerous.

2096. You have heard of some instances, in the north of England, where it is supposed that a large quantity of gas was emitted by the coal in a moment?—Yes.

2097. Then a fiery pit, although it might have abundant ventilation just previous to that, might become dangerous under those circumstances?—Quite so.

2098. Therefore, your answer must be received with some little limitation, that is, that by careful ventilation you could not prevent accidents altogether?—I would like my answer to convey this, that in an ordinary discharge of gas, a mine



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could be rendered safe. These extra outrushes of gas might render us still liable to a loss of life which we could not avoid.

2099. Mr. H. Vivian.] It is not always possible to explain how an explosion has taken place?—Frequently very difficult indeed.

2100. In the case of Hepburn, that is conceived to be a well ventilated pit?—Yes.

2101. The cause of the explosion was supposed to have arisen from the gas lodging in certain undulations of the roof?—Not the last explosion, the previous one.

2102. So the current of air swept along, and allowed the gas to remain in those undulations in the roof?—Yes.

2103. Could any human foresight have prevented such an occurrence?—Yes; if the gas was known to have been there, it could have been removed.

2104. But it was not known to have been there?—Then a proper inspection would have proved it to have been there.

2105. Then an inspector would have been required to test the fact, whether gas existed in each particular undulation of the roof of a large colliery?—Yes.

2106. Would that be practicable?—Quite so.

2107. With eight inspectors for the Northumberland and Durham districts?—Yes.

2108. To prove the fact of the existence of the gas in the undulations of the roof of a large colliery?—Yes.

2109. What is the area of a large colliery, such as Hepburn Colliery, in square miles?—I am sure I cannot speak to that.

2110. Chairman.] When an inspector goes to a pit, do you think that the viewer would not take him, if he could, to the best parts of the pit, and avoid the worst?—That is generally complained of.

2111. If the inspector knew his business, he would be pretty well up to that?—Yes.

2112. If he saw a disposition on the part of the viewer to avoid any part of the pit, he should naturally go there first?—Yes.

2113. And ask to see if there was anything the matter there?—Yes.

2114. With respect to these eight sub-inspectors you have spoken of, you would not like the inspectors' visits to be so frequent as to remove the responsibility from the coalowner in anyway, or from the viewer?—Not in the least to remove the responsibility from the viewers.

2115. Nor would you like to interfere with the coalowner in any way, as to carrying on the works in the way he thought best for his own economy and profit, provided he did so with a due regard to the safety of the lives of the people?—I would not interfere at all with the mode of working.

2116. In point of fact, in your opinion, as little interference should be made with the proprietors of collieries as possible?—Just so.

2117. Bearing in mind that due regard should be paid to the safety of the lives of the workmen?—That is all.

2118. I see, by the returns of accidents, that a great many of the accidents occur from the falls of the roof; in your opinion, is there generally in the mines of the north of England sufficient pit-props supplied at all times to the workmen?—There is, generally so.

2119. Do you think that anything could be done to avoid this loss of life from the falling of the roof?—Yes.

2120. What?—There should be more hands employed as deputies.

2121. Is it the deputies' particular duty to see that sufficient pit-props are placed, that the roof should be made as safe as possible?—Yes.

2122. Who applies the props?—He does.

2123. In the north of England, is it not the custom for the miner to place his own props?—He is not expected to do so, but from the want of sufficient hands or deputies he frequently has to do so.

2124. Generally, in the mines in the north of England, are there not sufficient hands kept to put up the props, so as to make the mines as secure as possible?—Not generally.

2125. If more of these deputies were employed, less loss of life would occur from the falling of the roof?—I feel confident of that.

2126. However careful the deputy might be, or the number of men employed,



ployed, it would be impossible to avoid accidents at all times from the fall of the roof?—Yes. I think there are some cases where it would not be possible to avoid it; some roofs are very slippery and very deceitful, and require more care; the falls are unavoidable in some instances.

2127. In some districts it is the custom in collieries to pay the hewer so much for standing his own timber; do you think that would be a better plan than to employ deputies?—No, I think not.

2128. Would not the collier, from a due regard to his own life, put as many props as he could to make the roof safe?—I think he should do so.

2129. Then bearing in mind that he was the man who would suffer if the roof was to fall, is it or not your opinion that it would be a better system if, instead of employing deputies to put props, that each man should in his own void stand his own timber, and be allowed so much for each timber he stands?—I think it would not be so sound and safe a way as the present mode.

2130. Then you think that the collier would not have a proper regard to his own life, and in his anxiety to earn more wages, would push on and hew coal, and he would not stand sufficient timber?—It is not owing to that cause that I think so; it is his want of practice in the knowledge of the roof and the nature of it. The deputy acquires a good knowledge of the kind of roof that is in his district, and he knows almost to a nicety how many props are wanted through the day there.

2131. At the same time you do not state that the collier is not in many cases reckless of his own life?—He is sometimes regardless of danger.

2132. You have known cases of colliers going into places where they were actually forbidden?—I have not indeed.

2133. You do not know of any other means of preventing the fall of the roof except proper support and timber; those are the only means you can suggest to remedy these accidents?—Yes, and the employment of good deputies.

2134. With all the attention which you have paid, you do consider that accidents of that kind can be altogether avoided?—No, they cannot be entirely avoided.

2135. With regard to winding the men up the shafts, nearly one-third of the accidents all over England occur from accidents at shafts; in the north of England, when the pit is done with, is it walled round or left open?—Walled round.

2136. In all cases?—Yes.

2137. Is that the custom of the district?—Yes.

2138. Suppose a pit was left open and unwalled, would there be complaints?—I think it is likely.

2139. Who would be the parties to raise them?—Some of the overseers or constables of the parish.

2140. Is the use of cages common in the north of England?—Quite general, I think, now.

2141. And guides?—Yes.

2142. Do you think there has been less loss of life since the cages have come into use?—I think there has been.

2143. What cages are now in use?—Large iron cages, with guides on.

2144. Are they safety cages; are they Mr. Fourdrinier's, or upon that plan?—None have those of Mr. Fourdrinier's but one or two collieries.

2145. Where those patent cages are applied, have any accidents occurred there?—Not that I know of.

2146. Are you quite sure they are employed in any collieries in the north now?—I only know that they were employed at Monk Wearmouth and Unsworth.

2147. Have you ever seen them yourself?—I saw them at Unsworth.

2148. Have you sufficient experience to know whether they are beneficial or otherwise?—I think they are quite sufficient to save life when the rope breaks, or a chain.

2149. Have they not a tendency to make the manager of the pit more neglectful, and to keep his ropes and his machinery in worse order?—I think not.

2150. You are speaking of what exists now at this moment; there are pits working with these patent cages?—It is a few months since I saw it at Unsworth.

2151. When were you at Unsworth?—Eight or ten months ago.

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2152. Whose apparatus was at work there then?—Fourdrinier's.

2153. *Mr. H. Vivian.*] Have they not been abandoned at many other collieries?—Not that I know of.

2154. *Chairman.*] Since these cages, whether patent or otherwise, have been employed, you say a greater number of accidents have occurred than before?—Yes.

2155. Can you account for that?—I think it is owing to the great speed with which they wind the men up, and also obliging them to come to bank on the top of the full tubs, drawing coals and men up at the same time in the same cage.

2156. When the men go to their work in the morning, is the full coal coming up when they are let down?—Not at that time.

2157. They always have an empty carriage to themselves?—Yes.

2158. But on coming up they come up on a full cage?—Yes.

2159. Then their increased weight makes a greater strain on the machinery, and of course the rope has a greater tendency to break?—The more frequent of the accidents in the shaft happen, not from the rope breaking, but from the cage catching some of the joints of the guides, and breaking all up together.

2160. Are the ropes and the machinery in the north of England generally kept in good order?—Yes.

2161. Sufficient attention is paid to that?—Yes, generally so.

2162. Would it not be possible then to avoid these catchings that you allude to, and to have the slides in such order that the cages never would be liable to catch in their ascent?—That proper attention should be paid to them, is necessary, and that they should wind the men at less speed, and without drawing coals at the same time.

2163. Would you enforce those regulations by Act of Parliament?—I think they should be attended to by Act of Parliament.

2164. *Mr. H. Vivian.*] When you say drawing coals at the same time, do you allude to drawing coals in the same cage with the men?—Yes.

2165. Have you any objection to the men descending while coals are being wound by the other rope?—Not if there be a partition between the ropes.

2166. *Chairman.*] If the speed were to be reduced, and anything was to happen in the pit to catch, as you have described, it would be easier for the engineer to stop the engine?—Yes.

2167. In your opinion, it is the great speed the engine is going at which prevents the facility of stopping the engine, and consequently the life of the workman is sure to be sacrificed?—Entirely.

2168. *Mr. Locke.*] What is the present speed at which they pull coals?—I cannot ascertain that.

2169. How many minutes to 120 fathoms?—Probably about three minutes.

2170. As much as that?—Yes.

2171. *Chairman.*] You do not know that they pull a great deal faster than that?—I never ascertained exactly; so I merely give that opinion from my present thoughts.

2172. You say they go a good deal too fast; have you formed any opinion in your own mind what speed would be a safe one?—No, I have not.

2173. You have already stated that you think if they went slower, the man at the engine would be able to stop his engine, and thus prevent the destruction of the guide rods?—Yes.

2174. Is it possible, at any reasonable speed, that the engine-man should know that something had caught, so as to be able to prevent the total destruction of the rods?—Yes, a man drawing at moderate speed; should a slight interruption take place, there is generally a signal rope down by the side of the guides, and the men would then have time to pull this before any destruction of life took place.

2175. You think the catching of a tub or guide on the rods is so slow in its operation that a man pulling at the rapper rope might then inform the engine-man at the top, and thus prevent the accident?—Yes, if the speed was moderate.

2176. *Mr. H. Vivian.*] Is it not customary now in the collieries in the north of England to give a signal when the men are coming up?—Yes.

2177. Do they not always wind at half speed?—They wind at a reduced speed; not so much as that, I think.

2178. Do you think it possible, as you have stated, for a man to put his arm out

out

out of a cage to pull a rapper rope?—Yes, the momentary suspension of the speed by the obstruction would enable a man of sufficient presence of mind to touch that wrapper rope, and if the cage was on that side of the shaft to give a sufficient pull.

2179. Mr. *Locke*.] Supposing the cage were on the other side of the shaft?—Then he would not have so ready an access to it.

2180. Can you not suggest some better remedy, than that a man should put his arm out of the cage and ring a bell to the engine-man, in order to tell him there was something wrong in the shaft?—I can only suggest that a more moderate speed would ensure fewer chances of the cage coming in contact with obstructions.

2181. You think if the speed was slower, there would be less chance of the obstructions having the effect of destroying the whole guide rods?—Yes.

2182. Would it not be better that you should regulate the speed, and inspect the guide rods and keep them in such perfect order, as that any little obstruction you should have to check should not cause the breaking up of the rods?—Yes.

2183. Mr. *Stephenson*.] How many accidents arising from the slides being out of order in the north of England have come within your knowledge?—Very few.

2184. Can you name any?—I could not particularise, at the present time; the complaints of the men to me are that they draw them at too great a speed, and thus endanger their lives; they say if anything was to happen, or should happen, we should be all killed. This letter I might read as a letter from a collier in Northumberland:—"March 7, 1853, Bedlington Colliery,—Dear friend, I write these lines to you for to let the Government inspector of the mines know that Bedlington Colliery is in a very bad state. At present there is two pits drawing coals; one is a upcast, and the other is a downcast pit, and the air from the downcast pit goes about 150 yards in, and returns to the furnace, and you will find my words true when you come to Bedlington Colliery; and when a man fires a shot the rœk (powder smoke) stands there, no air to carry it away; and a man can hardly see the candle that he is working with, and it is very unhealthy for any man or beast; it should not be allowed; a man is half poisoned every day he goes to work, and the Government inspector must come as soon as he has an opportunity to come to Bedlington Colliery. And there is another thing that I must state to you, down in Bedlington Colliery; there is seven men had to come up the pit together with two full tubs below them, each tub holds seven hundredweight and a half, that is, 15 hundredweight of coals; and each tub weighs four hundredweight a piece, and the weight of the cage one ton and a half; one of the men that made the cage told me that; that is two ton 13 hundredweight without a man being in the cage; and average of seven men, 10 stone a piece, that will be eight hundredweight, six stone; three ton, one hundredweight, six stone. What a shame it is that a man has no more protection for his life."

2185. Mr. *Fitzroy*.] When did you receive that letter?—March 7, 1853.

2186. Did you forward that to the Government inspector?—I did.

2187. Did he visit that mine in consequence?—He did.

2188. Was any alteration made at his suggestion in either of the particulars, as to want of air, or as to the weight carried up the shaft?—In respect to the air, there was some difference made, an improvement.

2189. What improvement did he suggest, or what improvement has been made?—He suggested the alteration of some stoppings being put up, or doors hung to improve ventilation.

2190. Have you visited that mine since the inspector visited it?—No.

2191. Have you heard from any one of the workmen employed in that mine that there is an improvement in the ventilation?—I heard from one of the workmen that there was an improvement in the ventilation.

2192. Has there been any alteration in the weight taken up?—There was not then, when I had the other information.

2193. Are you aware whether there was any suggestion made by the Government inspector on the latter point?—Not on that point.

2194. In whose district is this coal mine?—Mr. Matthias Dunn's.

2195. How can you be aware whether or not the inspector suggested anything with respect to the weight taken up the shaft?—The inspector called on me, and

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told me he had made some suggestion as to the mode of ventilation. I asked my informant, the next time I saw him, whether that was so or not. He said it was; but he said there was no alteration with respect to drawing the coals and the men.

2196. Are you aware, of your own knowledge, whether or not the inspector made any representation to the proprietor of the mine, as to the danger pointed out in that letter?—No.

2197. Are you aware how long a time had elapsed since the previous visit of the inspector to that mine?—I cannot tell.

2198. Are you aware whether that mine had ever been visited by the Government inspector?—No, I am not aware of it.

2199. *Chairman.*] You do not know whether it has or not?—No.

2200. *Mr. H. Vivian.*] Is Bedlington a fiery mine?—Not very.

2201. *Chairman.*] In your opinion, provided proper regulations were made, and the inspector had the power to see that the pits, machinery, and ropes were kept in good order, and that the slides which you have alluded to were always kept in sufficient order, do you think it would not almost entirely do away with the chance of accidents in winding up and down the people?—I think it would.

2202. In your opinion, would you wish that such regulations should be enforced by Act of Parliament, and that the inspector should have the power to see all the pits and the machinery, and everything connected with them, should be kept in proper order?—Yes.

2203. *Mr. Locke.*] Would that satisfy you if that were done, without any restriction as to the speed of pulling the coals?—Yes; I think the inspector's own opinion and judgment might be a sufficient guide to protect the men in that respect.

2204. You were asked about putting up props; is it the habit in the north of England that the miners should put up the props, or is it left to independent parties?—The practice is, that the independent parties have to put them up, but frequently the miners themselves put them up.

2205. That is, when the proper parties, those employed by the owner, fail to perform their duty, the miners, in their own defence, for their own security, are obliged to put up those props of wood?—Not from an inability to perform their duty, but having too many men to wait upon, the miners are obliged to do it or be idle.

2206. In your judgment the defect arises from the deficiency in the number of persons employed to put up the props?—Yes; I may say that I have, many a time, myself put up all the timber I have used in my place, for a week together, and I have seen many others do the same.

2207. Are the miners allowed anything for putting up these props?—Nothing whatever.

2208. The system in the north being, that the putting up the timber is entirely excluded from their labours?—Quite so.

2209. In your judgment, if the miners were permitted or ordered to put up their own timber, and had the management of the propping themselves, do you think that that would lessen the number of accidents arising from the roofs falling in, or increase them?—I am afraid it would not lessen them at all at the present time.

2210. Therefore, I may understand from you, that although there be this insufficiency in the number of men employed, you do not think, if the miner had the timbering in his own hands, the number of accidents would be diminished?—I think not.

2211. Can you tell the number of accidents that arise from the falling of roofs, in proportion to the number of accidents in the colliery?—I cannot say.

2212. Are they of very frequent occurrence?—Yes.

2213. *Chairman.*] You stated yesterday, that the workmen were not satisfied with the coroners' juries; have you ever heard them express any opinion how they would like to remedy the law, and make it satisfactory to themselves?—Their general opinion is, they wish a better class of juries.

2214. Is it possible to obtain a better class of juries from the places where the accidents occur?—Not in the localities.

2215. Have you ever heard the miners themselves express an opinion as to any alteration in the law that would be satisfactory to them?—There has not been any decided opinion expressed as to what should be substituted; but they complain

complain very much that the master blacksmith, or master joiner, and a colliery viewer from another place, are on the jury.

2216. Would it meet their views, provided it was enacted that no person engaged in the working of a colliery should be on the jury?—I think that is necessary.

2217. Would that meet the views of the colliers, and satisfy them as to the jury?—Yes.

2218. Do you think the practice and power of the coroner only being able to return a verdict of accidental death, or, in cases of gross misconduct, of manslaughter, is not an improper one?—Yes, I think so; he ought to have some intermediate power.

2219. *Mr. Cobbett.*] You say he ought to have some intermediate power?—Yes.

2220. What power?—Some power to assess damages or penalties.

2221. You would give the coroner power to assess damages?—Yes.

2222. Or to impose penalties?—Yes.

2223. *Chairman.*] Is there anything else you desire to state to the Committee?—I cannot say that there is.

2224. You came here to represent the association; it is by their desire that you are here giving evidence to-day?—Yes.

2225. Therefore of course they must be aware of the existence of this Committee?—Yes.

2226. You have nothing else to state to the Committee?—There was one other thing, with respect to schools; they are anxious that the Government should contribute 20*l.* per annum for every 100*l.* contributed by the coal hewers in the colliery.

2227. Out of the Consolidated Fund?—Out of some fund, and that the owner should allow all fines and forfeitures on the workmen's wages to go to such fund, for the purpose of establishing reading-rooms, libraries, and getting lectures upon any scientific subjects.

2228. *Mr. Fitzroy.*] Do the hewers propose to contribute anything themselves to these purposes?—That is in addition to the 2*d.* per week, or 4*d.* a fortnight, which they would contribute.

2229. Each man?—Yes.

2230. *Chairman.*] You mean 2*d.* a week every man?—Yes.

2231. *Mr. H. Vivian.*] The fines and penalties levied in a mine are frequently now applied to a sick fund, where a sick fund exists?—Not frequently; only in a few isolated cases.

2232. Should you consider that it would be equally to the colliers' advantage to apply fines and penalties to a sick fund as to a school?—Equally so; though the latter is preferable.

2233. *Chairman.*] Is there anything else you desire to state?—Not particularly. I have this paper, containing an account of the experiments at Seaton Delaval.

*Vide Appendix*

2234. What is this paper?—The experiments at Seaton Delaval, made on the 15th of June.

2235. Last year or this year?—This year.

2236. Who was with you?—Mr. Foster and Mr. Lamb.

2237. Those are the viewers of the pit?—Yes.

2238. Was anybody else with you?—The waste man, the overman, and others.

2239. Was there any Government inspector with you?—No.

2240. Did you measure the air by the anemometer, or by the powder smoke?—By the powder smoke.

2241. Have you ever seen the anemometer used?—Yes.

2242. You heard the evidence given with respect to the anemometer the other day; in your opinion do you think that the Government inspector could rely on the anemometer as a test for what quantity of air was passing through the mine, provided his visits were only once a month?—No.

2243. Do you not think that a badly-conducted overman could tamper with the anemometer, and render it not a sufficient test for the inspector to rely upon?—That is quite possible.

2244. *Mr. Locke.*] Did you take those measurements yourself, with Mr. Foster and the other person who was with you?—Yes.

2245. Did you agree in all your dimensions?—Yes.

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2246. Has Mr. Foster seen that paper, or any of the other persons with you?—The under viewer has.

2247. Do you know whether the conclusions or statements contained in that paper are admitted by the under viewer who has seen them?—Yes; I took each data down, and the powder was ignited and the smoke followed. I, with a watch, noted the time that was taken in passing the stated distance down, and the process of summing up the rate of current was done by the under viewer from these data.

2248. And from these data you have arrived at the quantity of air passing through the mine?—Yes.

2249. But whether it was properly distributed or not, is not on that paper?—No.

2250. It only accounts for the quantity of air passing down the down-cast or up the up-cast shaft?—Yes, and along the three chief passages into the workings.

2251. Does it contain anything else?—No.

2252. It is merely to show the extent of Seaton Delaval?—Yes.

2253. Mr. Stephenson.] Looking at this paper, which contains the statement of your experiments at Seaton Delaval, I observe a remark made here at the end of the calculations, giving an increase by the doors being opened of 9,345 cubic feet; now let me understand under what conditions the experiment was made in the first instance, before the doors were opened?—That door referred to is the door that leads to the boiler fires, and the boiler fires are fed by a scale at that door; one part of the experiments was made with that scale only and the door shut, and the other part of the experiment was taken with the door opened, and to show the increase.

2254. Mr. Locke.] Showing the increase of the furnace power?—Of the current.

2255. Mr. Stephenson.] This door was opened, and gave a free communication between the intake air and the engine furnace?—Yes.

2256. Where did you measure the velocity of the air by the powder smoke; what part of the mine?—In three distinct parts.

2257. At a considerable distance from the shaft?—Yes.

2258. Mr. Locke.] Where was the other part?—They were a good distance; in particular, the engine plane was a great distance from the shaft.

2259. What conclusion do you draw from this statement that you make here, giving the increase, with the door being opened, of 9,345 cubic feet?—I have no conclusion to come to from that; it was the result of a thought that simply struck Mr. Lamb the under viewer at the time, that there might be an increase by opening the door.

2260. You only increased the ventilation in this way by taking so much more air from the intake, and thus rendering the other parts of the mine less effectually ventilated?—It was done to prove whether that was the case or not.

2261. What was the object of the experiment?—It was to prove whether it would lessen the air current into the workings or not.

2262. If that was the object of the experiment, it was not necessary for you to take the increase of air 9,345 cubic feet at that door; ought you not to have taken the speed of the air by powder smoke, at the interior of the workings, away from the shaft?—They were taken at a great distance from the door, at the three separate places stated in the paper, and showed the increased amount of air going into the workings by the door being open.

2263. Therefore there was this increase through the working, notwithstanding that so much air had been abstracted from the intake by the opening of the door?—Yes.

2264. Chairman.] Did you make any experiment with the steam-jet alone without any boiler fires, merely by the motive power of the steam?—Just as it was.

2265. Then there was the furnace and the other heat going up the chimney, to rarefy the air, as well as the steam-jet?—Yes, the heat of the boiler fires, not the furnace.

2266. Mr. Stephenson.] When you opened the door to allow more air to be taken from the intake, although you robbed the intake of so much air, the furnace then burnt more vigorously, and heated the up-cast shaft to a higher temperature, and therefore although you borrowed some air from the intake to increase the intensity of the furnace, that increased intensity was more effective upon

upon the distant workings?—Yes, it caused a greater amount to go through all the workings.

2267. Mr. *Locke*.] As I understand, you fancied you gained greater power of ventilation by that means to the extent of 9,000 square feet?—Yes.

2268. And under a proper system of distribution, do you think it might be made use of as an increased means of ventilating the colliery?—Quite so.

2269. You had both the furnace and jet employed in that colliery?—No furnaces, only boiler fires, gas retorts, and the jets.

Mr. *Robert Henderson*, called in; and Examined.

2270. *Chairman*.] WHAT are you?—I work as a practical miner at Monkwearmouth Colliery, and carry on business as a brass-finisher.

2271. How long have you been employed as a practical miner?—Twenty-eight years.

2272. Constantly hewing coal in the pits?—I have been out of the pits about three years of the time at intervals, working various works.

2273. Are you a hewer of coal?—No, I work at stone-work, by contract for it.

2274. Mr. *H. Vivian*.] Chiefly in driving stone-drifts?—Yes, and other work.

2275. *Chairman*.] Were you selected as part of a deputation from Mr. Dunn's district to come here and give evidence?—Yes.

2276. When did you receive information?—About three days before I came here.

2277. Did you ever work in any other colliery than Monkwearmouth?—Yes.

2278. State where?—I commenced my first operations at Kenton, I removed from there to Cramlington, then to Seghill, from there to Tyne-Main, then to Fawdon, and from there to Felling, and then to Killingworth.

2279. In point of fact, you have worked at a great many mines, and have a pretty extensive practical experience?—Yes.

2280. You said you were a worker in brass?—I carry on the business of a brass-finisher at the same time.

2281. You have invented a safety lamp?—Yes.

2282. Has that been in use at all?—It has.

2283. Have you got one here?—Yes.

2284. Hand it in?—Yes (*the Witness handed the lamp to the Committee*).

2285. The safety-lamp on the table is the one that you have invented?—Yes.

2286. And it differs from the Clanny lamp, inasmuch as it has a double glass, and the space between the two glasses is filled up with distilled water?—Yes.

2287. What is the object of having it so constructed?—My object was to remove the objections of the colliery viewers in 1849 to the Clanny lamp, although they are not grounded on sound principles with regard to the cracking of the lamp.

2288. Is it not something similar to the lamp invented by Dr. Glover?—It was previous to Dr. Glover's; the only difference is, that Dr. Glover's takes air down between the two cylinders, and separates them.

2289. And yours is one cylinder?—Yes, united top and bottom.

2290. With merely holes to let the water in?—Yes.

2291. What is the weight of that lamp?—Three pounds and a half.

2292. Has that been used extensively in coal mines?—That lamp has been used 10 months in Monkwearmouth colliery by young Laing.

2293. What kind of light does it give?—A good light.

2294. Better than the Davy?—Considerably.

2295. Mr. *H. Vivian*.] What is the object of the water between the glasses?—To equalize the temperature of the glasses.

2296. Do glasses frequently crack from heat?—No, they do not frequently crack.

2297. *Chairman*.] Have you ever known one of your lamps crack?—I have not known any lamp crack.

2298. Constructed on your principle?—I have not.

2299. Not any lamp?—Not by fair burning.

2300. Mr. *Locke*.] Does it generate any steam above the surface of the water?—It does not.



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2301. Have you seen that yourself?—The first glass that I had made cost me 9s.; I connected it with brass fittings and continued to burn the lamp between two hot walls for one week, but no steam appeared whatever; I then took at intervals a pint of cold water and threw it on the glass to try to break it, but did not; I then reduced the glass to the present size.

2302. Have you ever known any of them broken by heat?—No.

2303. Broken by any other means?—Yes.

2304. By what means?—By a fall of the lamp.

2305. And you can answer for its giving a superior light to the Davy?—I can.

2306. Does it give a superior light to the Clanny lamp?—There is not much difference; the opinion of some is that it is much superior, and the opinion of others is that it is not.

2307. In your opinion, it is a safer lamp, the light being equal, because it prevents that cracking of the glass, arising from its getting heated if water comes in contact with it?—I do not think it is much superior to any glass lamp; I have implicit confidence in the Clanny lamp.

2308. *Chairman.*] And have you implicit confidence in Dr. Glover's lamp?—I have most confidence in all lamps that have glass round the flame, inasmuch as I have seen them extensively used at Monkwearmouth Colliery.

2309. Then you do not agree with the Report of the Committee of 1852, which says that no lamps are safe?—I do not.

2310. Your opinion is, that they are safe, and ought to be enforced in fiery collieries?—My opinion is, that all lamps constructed on the principle of Dr. Clanny's are perfectly safe.

2311. In those you include the lamps invented by Dr. Fife and Dr. Glover and yourself, and all lamps which have glasses to protect the lamp from the rushes or blowers of gas blowing through them?—I have not made any experiments with Dr. Glover's lamp or with Dr. Fife's. I have my doubts with respect to the principle of Dr. Glover's. I had the same idea, and made experiments, but on account of the difficulty of uniting the gauze properly at top and below, I entertained a doubt with respect to its being sufficient to prevent the passage of flame, seeing that the flame will pass with a very little injury to the gauze; I therefore gave up the idea, and adopted the present one.

2312. Suppose in Dr. Glover's lamp the gauze was properly united, your objection would be removed (*handing Dr. Glover's lamp to the Witness*)?—Decidedly so.

2313. And Dr. Glover's lamp is very considerably lighter and more portable than yours?—It is lighter, but my lamp can be made lighter; I make the lamps of this strength because they are more approved of by the workmen generally.

2314. The Committee take your answer to be, that these glass lamps being properly constructed are, in your opinion, perfectly safe?—Yes.

2315. Therefore, you think that in all cases where fire exists in any quantity in mines, that the Legislature ought to enforce the use of properly constructed safety lamps?—Yes.

2316. You do not say that with reference to having the ventilation worse, but as an adjunct to good ventilation?—Yes.

2317. *Mr. Locke.*] What was the temperature of the two walls when you burnt your lamps?—I had no instrument to take the temperature; but judging from the state of the place in which it was confined, it was not much below that at the Monkwearmouth Colliery, which I consider a good test for any lamp whatever.

2318. Is that about 78 or 80 degrees?—I have been informed, in some parts where I have made inquiries by the overmen, that it was as high as 86. It is so hot, that the perspiration from you runs down from your body into your shoes in some parts, although it is not generally so.

2319. *Chairman.*] You do not come here to represent your lamp as better than others, your evidence merely is, that all lamps made with glass, in your opinion, are perfectly safe?—Yes.

2320. Supposing them to be properly and carefully constructed?—Yes, and under the care of proper men.

2321. You stated, that in all fiery mines, you think the Government should have the power imperatively to enforce the use of the safety lamp?—Yes.

2322. Supposing



2322. Supposing the use of the safety-lamp was so enforced, do you think it ought to be secured by a lock and key at all times?—Yes. Mr. R. Henderson.

2323. Should the workman have any key to open that lock?—No.

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2324. You think then, that the key should be in the hands of proper persons so employed to take care of the safety-lamps down the pit?—They are in the north of England; it is a rule for the deputy in that district, that his work lies to examine all the lamps at a certain station, and to lock all these lamps properly; it is also expected that the workman is satisfied that that lamp is locked, and no man whatever is allowed either to take keys or any other instruments to open the lamp; if it is known, he is subjected to a penalty.

2325. Do you think that that law should be rigidly enforced in all cases?—The rules are sufficient, in my opinion, to enforce such regulations.

2326. Do you think, with respect to cleaning the lamps and repairing them, that one man should be employed at the top of the pit, whose constant duty it should be to fill the lamps with oil and clean them, and see if they are in repair, and if they are out of repair, to repair them?—A proper person should be appointed for that generally.

2327. And that no other person but that person so appointed should be allowed to clean the lamps, or fill them with oil, or repair them if necessary?—It would almost be impracticable in any extensive colliery in the north of England so to do.

2328. Supposing one man would not be sufficient, then you would have two, or a sufficient number, whose constant duty it should be, at the top of the pit, to fill the lamps and clean them?—I have no objection whatever to the workmen taking their own tops home, and cleaning their own gauze; but in my opinion, it is very desirable that there should be more pains taken in instructing the men generally on the merits of those lamps; I have known a lamp pass all the officers in charge, and be in a very dangerous state.

2329. If the man who had the care of the lamps, and who had to repair them, had them through his hand every day, do you not think that he would be the better judge whether the gauze was in repair or out of repair?—He could not do it, on account of the number he would have through his hand.

2330. Suppose there were a sufficient number of men, whose constant duty it was to repair these lamps, from habit of observation, would they not be better able to see whether any part of the gauze was out of repair than the common working man?—If he was sufficiently awake to the merits of the lamp he might; but in no such case should I say that a lamp should go into a pit without being examined by the deputy of that district.

2331. Mr. H. Vivian.] Supposing a man took his lamp-top home with him to clean, it would be necessary that that lamp-top should pass through the hands of a competent man before the man could take his lamp down the pit?—Yes.

2332. Chairman.] Do you think that the working men in your district agree with the Report of 1852, as regards the safety-lamp, or do you think they place confidence in the safety-lamp?—There is much difference in the opinions of the men on the use of the safety-lamp; I can only speak from what I have experienced, and what instructions I have from other parties. The men at Monkwearmouth will not work with a common Davy lamp if they can get a glass lamp; they generally buy a Clanny lamp themselves when the company has none in store. I have sold upwards of two dozen to workmen, which cost 11s. each.

2333. In your opinion, has the ventilation improved within the last few years at the collieries in your district?—I could not speak generally to that; the colliery that I am in is a very difficult colliery to judge of; it has such extensive bounds, that no man can form any idea of what is going on in another part of it; but I am fully convinced that it is quite possible to carry a sufficient amount of ventilation through any mine, provided there is sufficient attention paid to the return airways.

2334. You have had no experience of the steam-jet?—No; none whatever.

2335. You are in constant communication with the men in your own mine at Monkwearmouth?—No, not constantly in communication.

2336. Do you know their opinion as to the way in which the ventilation is carried on in the pit where you work?—The opinions are various; they work on two systems, the long wall and the bord and wall system.

2337. How do they ventilate at Monkwearmouth?—By furnace.

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2338. Mr. H. Vivian.] Is there a furnace at Monkwearmouth?—Yes.

2339. How long has it been erected?—I should think ever since it has been a colliery.

2340. Chairman.] Monkwearmouth is the deepest pit in the kingdom?—The part I am working in is 307 fathoms to the bed.

2341. Mr. H. Vivian.] Is that down the stone drift?—In the A pit.

2342. Chairman.] Is it your opinion, that when a sufficient ventilation is brought into a pit, by furnace or otherwise, great attention should be paid to carrying it all over the works by splitting the air?—Yes.

2343. Yes; and that the airways should be sufficiently large?—I cannot see how any mine whatever can be ventilated unless there is a sufficient amount of passage for the air to travel; I know, for a fact, in more places than one that I have seen, both in England and Scotland, that it is not possible for a man of my size, which is only a moderate one, to squeeze himself through the return main channels in parts.

2344. In the returns of the loss of life, it appears a great many lives are lost by the falling of the roofs; in your opinion is sufficient timber furnished to a colliery?—In some cases there is an abundance of timber, and in others there is a deficiency.

2345. Are there, generally, sufficient deputies to stand the timber?—The deputies, generally speaking, have more work than they can perform; at least I had when I was a deputy.

2346. You have been a deputy yourself?—Yes.

2347. Do you think it would be a better plan to entrust to a collier the standing of his own timber, rather than leaving it to the deputy?—I think not; the deputy is the most suitable person.

2348. Why not?—Because it is the duty of the deputy to examine and take the sense of the district he is occupied in; he is a man that has a very important office, inasmuch as he has to report to the overman the full state of his district with regard to gas, and that sort of thing.

2349. You heard Mr. Jude's evidence with regard to the winding up and down the pits; do you generally concur in what he has said?—I differ from Mr. Jude in some things.

2350. State in what respect?—I differ from Mr. Jude with respect to the man putting his hand out and pulling the bell-rope; I think it is quite impracticable.

2351. Do you agree that the inspector, by legislation, should be given a power to enforce the machinery and the ropes being kept in good order, and that the guides should be kept in good order also?—I am of opinion that the inspectors ought to have power to see that everything about a pit is kept in proper order, for the safety of the workmen generally.

2352. In your opinion, if that was more sufficiently attended to, do you think that the accidents would be a great deal diminished?—I think so.

2353. Have you to complain of the guides being out of order in the pit in which you are at work?—Not generally.

2354. Do you think the men are wound up the pit too fast?—I do.

2355. Do you think, that if sufficient attention was paid to the machinery, the guides being in perfect order, that any danger would arise from winding men up at the speed at which they are wound up now?—I think it would not be safe to wind them up at that speed, inasmuch as the engine-man would not have the same control over the engine that he would have if going at a slower speed.

2356. Mr. H. Vivian.] The winding-engine has a heavy fly-wheel attached to it?—Yes, generally.

2357. Chairman.] Then, in addition to giving the inspector the power to see that the machinery and ropes and guides were in good order, you would also give him a power by law to regulate the speed, so that the men should not be wound up faster than they thought consistent with safety?—It is desirable.

2358. Mr. Stephenson.] Do you know how many accidents of that kind have occurred in the neighbourhood where you work?—I do not.

2359. Are they not very rare?—I cannot speak to the fact.

2360. Do you know of any accident that has happened from great speed in your neighbourhood?—I cannot speak to the fact generally.

2361. Mr.

2361. *Mr. H. Vivian.*] Is Fourdrinier's cage now employed at Monkwearmouth?—They have taken the wedges off lately. *Mr. R. Henderson.*

2362. Then, practically speaking, the cage is not now employed at Monkwearmouth?—The wedge is not used at present; at least it was not when I was there. 30 June 1852.

2363. And the wedge is the safety portion of the cage?—That is Fourdrinier's invention; but I am informed from good authority that the owner pays Mr. Fourdrinier still for the use of that, if they think proper to apply it.

2364. They have abandoned the use of it, as far as I understand at present?—It is not used at present.

2365. Are you aware why they have discontinued the use of it?—The reason why, as far as my information goes, is, that there was some difficulty connected with the wedge being entangled with the sides of the pit.

2366. So that the danger in using such a machine is, in truth, greater than that of using an ordinary cage?—Not if everything is in accordance with it.

2367. Is not the danger greater, inasmuch as the machine is liable to get out of order and get jammed in the pit?—The objection, I think, that is generally raised against the use of either Fourdrinier's or Bell & Grant's, is, that the small chain which adjusts the eccentric or the spring, is apt to break and cause the wedge to come into action, or the eccentric to come into action; and for this reason there are some objections to them.

2368. The result of that would be, that the cage would stop in the shaft?—It would if the chain was to give way.

2369. And the result of this stopping in the shaft would be, that the rope would coil on it?—It would rest down upon it, but the engine-man could not but know that such a thing had taken place.

2370. Still, with an engine going at that speed he could not instantly arrest his engine?—He could not.

2371. And the result would be, that the cage would give way and surge?—I cannot say that the cage would give way, because I have seen it hang.

2372. Have you ever seen Bell & Grant's?—It is the one I am speaking of; they use them at Monkwearmouth also.

2373. It has been found that the complication of the machinery is so great, that the use of them has been attended with more danger than the use of the ordinary cage?—I cannot say that; I have not sufficient experience to say that.

2374. They are not at present used?—Not when I left.

2375. The system of long-wall work has lately been introduced into Monkwearmouth colliery?—About three years in practice.

2376. Have explosions been more or less frequent since the introduction of the long-wall system?—There have been many partial fires, but with regard to being more extensive or less, I cannot say. But where the long wall is kept in proper order the ventilation is much better. The men work with a great deal more freedom with regard to ventilation.

2377. Have any serious explosions taken place in Monkwearmouth by which lives have been lost?—There have been lives lost, but not to such an extent as in other parts.

2378. Have those accidents occurred under the long-wall system?—Some have, and some have not.

2379. In your judgment, is the liability to explosion greater under the long-wall system as applied at Monkwearmouth, or under the ordinary board and wall system?—I prefer the long wall.

2380. *Chairman.*] Why?—It is easier to ventilate.

2381. *Mr. H. Vivian.*] What is the thickness of the seam at Monkwearmouth?—It varies from three to five feet.

2382. And falls readily?—In some parts of the seam it does not.

2383. Where it does not fall, can the long-wall system be carried out?—Yes, where the seam does not exceed that thickness.

2384. In that case it would be necessary to bring in materials in order to stow?—There is always abundance to be had in Monkwearmouth Colliery from the various movements of the mine.

2385. *Chairman.*] You heard Mr. Jude's evidence with respect to inspectors; he said, that in his opinion an inspector should be appointed, and eight sub-inspectors would be sufficient for that district; do you coincide in that?—I am

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of opinion that sub-inspectors would be a great improvement, or would be the cause of much improvement in the ventilation of mines, inasmuch as the coal proprietors and viewers generally would pay more attention to keeping open the airways; it is very defective now.

2386. What class of men would you recommend as sub-inspectors?—Practical miners; a man that has been brought up to it, and could turn his attention to it, and not be easily deceived, who would search into every hole and corner. I would also impose on him the duty of travelling the whole area of the mine in his visits, which I think it is not reasonable to request the head inspector to do.

2387. But you would give him no power, you would give him solely the authority to report to the head inspector?—To report to the head inspector, and a proper ledger to be kept for reference.

2388. Do you think that the owners of collieries would have equal confidence in such a man as you describe the workmen would have?—I think so.

2389. Do you think that eight would be sufficient; how often would those eight be able to go through each colliery in their district?—It would be a very difficult question to determine the number; but eight would be an abundance.

2390. For the district you speak of?—Yes.

2391. And admitting there were eight appointed, how often would they be able to visit each colliery in their district?—I have not made a calculation.

2392. How often do you think they should visit?—I think their visits should not be longer than two months, and not less than one.

2393. You would appoint no inspection that should take the responsibility out of the hands of the coal proprietor or the head viewer?—By no means to interfere with the management of the colliery.

2394. You would not think it advisable to enact any law that would interfere materially with the operations of the coalowner or the viewer further than what was actually necessary for the preservation of the lives of the workmen?—No.

2395. Mr. Stephenson.] The present system in the north of England is, that a set of men called the waste men should travel the workings either wholly or in part every day?—The master wasteman is expected to travel, as far as my information goes, part of it daily.

2396. In the course of the week he has to go through the whole?—Yes.

2397. Chairman.] There are men always employed solely for the purpose of walking through the whole of the air courses of the colliery from week to week?—It is so at Monkwearmouth.

2398. For sub-inspectors, whose duty it would be to walk the waste, would you have that class of men from the present workmen?—They ought to be taken from the most intelligent and practical men, such as overmen.

2399. What would be the process, supposing a sub-inspector found the airways insufficient, to whom would you have him address himself?—He ought to inform the head inspector, and also at the same time the colliery viewer.

2400. The duty of the wasteman at present is, to inform the colliery viewer when the airways are not in good order?—He informs the overman or overviewer, and there it rests.

2401. That is your objection?—My objection to the present system is, that there is nothing to enforce, and the colliery overman and viewer lives in hopes for the better. There appears to be a slavish fear in the minds of overmen generally, with regard to the impression that is made upon his mind on the day when he takes in his bill, with regard to the expenses of the colliery not being reduced; and by this means, he passes things for the sake of a few shillings which would considerably improve the ventilation. Sub-inspection would remedy this, because those evils would have to be removed if Government enforced it.

2402. Chairman.] You said, that you thought the inspectors should not visit a mine less than once in two months, and not oftener than once a month?—I think that would be sufficient.

2403. Once a month, or once in two months, which would be sufficient?—He should be there once a month, but there are cases in which it is necessary that he might visit oftener than once in two months.

2404. Mr. Stephenson.] In fact, his visits ought to be regulated by the character of the colliery, whether it was dangerous or not?—Of course.

2405. There are many parts of the north of England coal-field, where the mines.

mines are free from gas, and the roof is good, you would say there that monthly inspection is not so necessary as it is in the larger mines?—But notwithstanding that, these are places at which accidents have frequently occurred. Washington, for instance, is a seam which might be easily kept, but by placing implicit confidence there appears to have been some neglect, and an accident did occur.

Mr. R. Henderson.

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2406. *Chairman.*] Are there any pits in Northumberland ventilated by natural ventilation, without any furnace at all?—Not that I am aware of.

2407. You heard what Mr. Jude said with regard to the coroners' juries; do you concur with Mr. Jude in his opinions as to the coroners' juries; do you think the present system of coroners' juries is satisfactory?—I think not.

2408. State in what respect you think it not satisfactory?—There appears to be no power whatever vested in the hands of the coroners' juries to inflict such penalties as are necessary for the relief of the distressed, and to enforce more regulations.

2409. When men are killed by accidents in coal mines, do not the owners come forward and do all they can for the support of the widows and children in your district?—Perhaps, as to the last explosion, that has been the case; such as Washington and Usworth, and some others, there has been a kind of circular or notice to the workmen generally, soliciting their aid, and they have given a shilling or sixpence, according to their circumstances.

2410. Do the proprietors of the mine contribute?—It is expected so.

2411. They generally do?—Yes, I think so.

2412. *Mr. Fitzroy.*] Do you think it would be an improvement if legislation should provide a forced contribution on the part of the proprietors of the mines in support of the wives and children of miners killed by accident, instead of leaving it to their voluntary contribution?—I think that there ought to be power in the hands of the coroner and jury to levy such fines as they thought the case deserved, in case of neglect; but I am of opinion that a fund ought to be established, to be supported by workmen, and the fines that are taken from the earnings, such as "laid out" and "set," and other forfeitures, should go to that fund.

2413. Do you think it desirable to make it compulsory on the proprietors of mines to provide for the maintenance of the wives and families of those who have been killed by accidents in their mines?—If there be power vested in the hands of the coroner and juries.

2414. No matter in whose hands it is vested, do you think it is desirable by law to make such a provision?—Yes, if caused by culpable neglect.

2415. *Mr. Cobbett.*] You heard Mr. Jude's evidence with regard to the juries who were summoned by the coroner; do you agree with him that persons who are connected with these mines, viewers and overlookers and so on, should not be summoned on the coroner's juries?—There is a fear of intimidation by summoning such as a master-blacksmith, master-joiner, and shopkeepers that have a sort of interest indirectly. My opinion is, that the juries ought to be made out with something like three or four, or five or six practical men, and the rest tradesmen generally.

2416. That is, there should be jurors taken not connected, directly or indirectly, with the coal mines?—No; I am of opinion that there should be practical men in all cases, either viewers or practical workmen, with a sufficient amount of knowledge to put such questions as are calculated to elicit the truth from the witnesses, with the aid of the inspector; by that mode I think the truth of many accidents might be come at, and more just decision come to.

2417. *Mr. Fitzroy.*] Have the verdicts given by coroner's juries in your district generally given dissatisfaction?—I am not prepared to say.

2418. Does not the answer you have just given assume, that the verdicts given by coroner's juries have not been consistent with the facts, and have given dissatisfaction?—The answer I have given intimates that the truth had not been fully elicited, and that there is a danger of tampering with evidence; I know of cases, at least I have been informed of cases, where men, when an accident has taken place, who have been witnesses, have been examined at the colliery office by the viewer, with reference to their opinion before they went there.

2419. How do you propose to remedy that evil; by altering the constitution of the jury?—If there be power vested in the hands of the coroner's jury to inflict fines as previously referred to, the men, such as sub-inspectors and

*Mr. R. Henderson.* practical men sitting on that jury, would be better calculated to put questions, and to find out the cause of these things.

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2420. *Chairman.*] Do you think the workmen generally are satisfied with the coroner's juries at present?—The universal opinion, as far as I have gathered it, is, that one verdict is universally come to, that is accidental death; it is quite a common proverb.

2421. That may depend upon the state of the law, because, by the present state of the law, the jury has no discretion between accidental death and manslaughter; unless it was a case of very gross and wilful carelessness the jury would not be justified in giving a verdict for manslaughter; is that not so?—Of course they would not be justified.

2422. Then the jury have no power to give any other verdict than accidental death?—But the manner of summoning the juries is not, in my opinion, sufficient to elicit the truth in these cases.

2423. *Mr. Fitzroy.*] Do you think it would be an improvement if a certain number of practical miners were summoned on every coroner's inquest?—I think that it would have a tendency to elicit the truth, with the aid of the inspectors, more fully.

2424. *Chairman.*] You heard Mr. Jude's evidence with respect to schools; is it your opinion that the workmen would consent to the Legislature enforcing them to pay a certain sum out of their earnings in all cases for the support of schools?—They may in some cases differ, but I think, generally, they would coincide.

2425. With the same provision that Mr. Jude made, that is, that the workmen should have a certain share in the management of the schools, and in the appointment of the schoolmasters?—Yes.

2426. Do you concur in his opinion with respect to mechanics' institutions and reading-rooms that he spoke of?—I think that if there was an institution established, or some extension made in the colliery districts, in the way of establishing libraries, and a room of sufficient dimensions for lectures to be given on chemistry and the various branches of science, it would be calculated to do much good; but I should not depend on them for the education or the examination of officers.

2427. *Mr. Fitzroy.*] Is there a great want of schools amongst either the colliers or labourers in the district with which you are immediately connected?—I think all the colliers are provided with a school-room of some kind, more or less, large or small.

2428. Is the school accommodation generally sufficient to accommodate the number of children belonging to the different colliers?—I think not.

2429. Are most of the children of the colliers sent to school?—There is a great number sent, but there appears to be a defect with regard to the teachers; they do not appear to possess the same amount of attraction that there is in national schools, or in schools in large towns.

2430. In cases where parents abstain from sending their children to school, does it arise from a want of confidence in the schoolmaster or from want of means on the part of the parents?—Generally from want of means.

2431. What is the average rate of wages now paid to workers in coal-mines?—It is a very difficult question to answer.

2432. *Mr. H. Vivian.*] What does an efficient cutter or hewer get?—They vary very much, from 15 s. to 25 s. a week; it is very rare where they reach to 25 s.

2433. How many days do they work to earn that money?—They will have to work 11 or 12 days a fortnight.

2434. *Chairman.*] They generally lose the Monday; they do not work much on the Monday?—Not in the district in any part of my experience.

2435. *Mr. H. Vivian.*] On what day are wages paid in the north of England?—On Friday generally.

2436. *Mr. Fitzroy.*] In the case of those colliers it is not from want of means that they fail to provide for the education of their children?—In some cases.

2437. In the case of men earning between 15 s. and 25 s. a week, it is not the want of means that prevents him from sending his child to school?—It is in some cases the want of means.

2438. What is the average charge made for schooling for children of that description in your neighbourhood?—The child at first going to school pays

3*d.* per week to learn plain reading, and as he advances, if he comes to write, 6*d.* a week, and when it comes that he can do arithmetic, he advances to about 7*d.* a week. Mr. R. Henderson.

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2439. Do you think that 3*d.* a week or 6*d.* a week would be too much for a man who was in the receipt of wages averaging from 15*s.* to 25*s.* a week to pay for his child?—I think it is more than he can afford generally.

2440. But you think that he would not object, notwithstanding the 3*d.* is more than he can afford, to pay the 7*d.* if facilities were given in other quarters to the formation of a school?—Not at all.

2441. Mr. H. Vivian.] Would you recommend the assessment being made on the child or the man, or on the earnings of the man?—I would recommend it on the man weekly, to be detained at the colliery office; but I apprehended that this would not raise sufficient funds for the education of the mining population generally.

2442. Mr. Fitzroy.] You contemplate then that all persons employed in labour in mines, whether married or single, should pay this weekly contribution?—Yes.

2443. Mr. H. Vivian.] And then have the benefit when they have children?—Yes; I may also add that at Killingworth colliery the owners built very extensive schools, and employed three teachers, a female teacher and a female for infant school teaching, and a master. The workmen there paid 6*d.* a fortnight, or 3*d.* a week, for a number of years, but after the colliery changed hands it was done away with, and they pay on the system I have just described of 3*d.* per week per child.

2444. Chairman.] Have you anything to say as to the establishment of a fund?—In my opinion, I think it is desirable that a national fund ought to be provided for the support of the widows and orphans of parties who meet with their deaths by accident, and the aged.

2445. How would you provide that fund; by contributions from the workmen?—By contributions from the workmen.

2446. When they were in health?—In health, and working.

2447. Similar to the present system of benefit societies?—Similar.

2448. Do benefit societies exist pretty extensively in your district now?—They do.

2449. Are they pretty generally joined by the workmen?—They are.

2450. Can you give the Committee any idea of the amount paid to a man who has been injured by the work, and out of employment; how much the fund would allow him?—The fund I am connected with allows 6*s.* per week.

2451. What contribution would the men pay in order to gain 6*s.* per week?—One shilling and sixpence per month up to 2*s.*

2452. How long would he have to subscribe before he would commence to receive this 6*s.* a week from the fund, in case he was sick or met with an accident?—Only one contribution, one month.

2453. He would immediately become a full member?—Yes; but there are cases of what is called life boxes, that a man entering has to pay a premium of something like 10*s.* or 15*s.* or 20*s.*; but, generally speaking, the yearly funds are dissolved and are recommenced at Christmas.

2454. When they are dissolved the funds are divided among the members?—Yes.

2455. Are the Committee to understand from you that, although the system of funds is pretty general in your district, you do not consider it sufficient, and you would as well, in addition to those funds, recommend that a fund should be established by Act of Parliament, which the miners should be compelled to support, and that they should be allowed a certain sum in case of accident or in case of sickness?—I omit sickness, but provide for the aged and worn-out miners.

2456. Merely in case of accident?—In case of accident or death, for the provision of their orphans and widows.

2457. You consider that the present funds apply sufficiently to sickness; this fund would be solely and exclusively for the provision of widows and orphans of men killed in the works, as well as those who meet with accidents?—I do. I do not wish to take the burthen off the parish; by no means. Though the allowance in such cases is only a starvation allowance, I wish this fund to be applied generally, that is, in all cases of accident and old age in the coal mine. Supposing 33,000 miners in the counties of Northumberland and Durham, at 1*d.*



per week, it will give 137 *l.*; and taking the average oftakes at 3 *d.*, it will give 26,572 *l.* per annum, which I think will be sufficient to meet all cases, with the decrease of accidents by a more rigid inspection.

2458. Have you any further evidence to offer to the Committee?—No, I think not.

*Lunæ, 4<sup>o</sup> die Julii, 1853.*

MEMBERS PRESENT.

Mr. Hutchins.  
Mr. Fitzroy.  
Mr. Hussey Vivian.  
Mr. Baird.  
Mr. Cayley.

Mr. Stephenson.  
Mr. Mostyn.  
Mr. Cobbett.  
Mr. Locke.

EDWARD J. HUTCHINS, Esq., IN THE CHAIR.

Mr. *David Swallow*, called in; and Examined.

Mr. *D. Swallow*.

4 July 1853.

2459. *Chairman.*] WHERE do you live?—At Rainford, near St. Helen's.
2460. Are you now employed as the agent of the workmen in that district?—At present I am corresponding secretary; when I was examined in 1849, I was agent.
2461. There is an association there?—Yes.
2462. Will you describe the district?—It is called the Lancashire and Cheshire Branch of the Miners' Association.
2463. Is it connected with the Miners' Association of the North of England?—Only by correspondence.
2464. You are the corresponding secretary?—Yes.
2465. Will you describe your duties?—My duties are to attend to all the correspondence of the society; to direct my attention to the subject of accidents in coal mines, to attend coroners' inquests, and watch the proceedings on behalf of the men, and generally to promote their interests.
2466. How long have you been connected with that society?—I was first appointed agent on the 7th November 1842, and I held the office of agent until February 1852; since that time I have held the office of corresponding secretary.
2467. For many years have you been acquainted with the views of the working people?—For 11 years my attention has been entirely devoted to that subject.
2468. Have you been practically engaged in mining?—I worked 16 years in coal mines.
2469. How long have you ceased to work?—The last time I worked was on the 7th September 1842.
2470. Is that the time you first began to be their agent?—It was some few weeks previously; but I was engaged by men in collieries which I worked at locally, so that I have been engaged ever since the 7th September, but not in the capacity of agent.
2471. Is your practical knowledge of the workmen confined to one colliery, or have you worked at a good many?—I have worked at a good many.
2472. Have you ever worked out of your own district?—Yes, I have worked in some parts of Lancashire, and I have worked at Bradford, in Yorkshire, and Wakefield; principally about Wakefield.
2473. Have you worked in the Northumberland and Durham districts?—No.
2474. You are not practically acquainted with those districts?—No.
2475. You gave evidence before the Committee of the House of Lords in 1849?—I did.
2476. You then went very fully into the question of inspection?—Yes.
2477. You were a great advocate for inspection at that time?—Yes.
2478. Were you party to a Bill which was brought in by Mr. Duncombe and others?—Yes.

2479. Was



2479. Was that Bill rejected?—It was not pressed to a second reading; it was withdrawn upon a promise from the then Home Secretary that if we would not press the Bill to a second reading, the Government would take the subject in hand, and they did so, and the present system of inspection is the result.

2480. Your opinion then was, that the inspectors should have more power than the Act gave them?—Yes.

2481. Since that time inspectors have been appointed?—Yes.

2482. Is it your opinion that their appointment has been beneficial in the prevention of accidents?—I believe it has.

2483. Do you think that the working people themselves are satisfied with the present system of inspection?—It is far from satisfactory.

2484. Can you state why they are not satisfied, and the points on which they express their dissatisfaction?—They are not dissatisfied with the present inspection, so far as it goes; but, in the first place, they think that the number of inspectors is not sufficient.

2485. They wish the number to be increased?—They wish the number to be greatly increased, and their powers to be extended.

2486. In what way do they wish for an extension of their powers?—For instance, the inspectors have no real power; they have only power just to inspect, and report, and suggest.

2487. What power do the workmen wish to give them?—The workmen wish to give the inspector a power, where he finds anything which is really dangerous and wrong, to point it out to the managers and proprietors of mines, and tell them there is an evil which must be remedied by some means or another. We do not wish the inspector to direct the particular method or way in which it should be done, but that he should give a reasonable time to remove the evil; and that if when he goes round again, he finds it is not removed, he should have the power of laying an information before the magistrates, and of calling upon the managers or proprietors to answer for the neglect.

2488. For that purpose, would it be necessary to give the magistrates more power than they possess at present?—Yes; the magistrates have no jurisdiction at the present moment.

2489. Would you, at any time, give the inspectors a power to stop a mine, if it was in very bad order?—Yes, if it was very dangerous indeed; but I imagine that a case of that sort would seldom happen; I think it is a power which must be used with very great caution. I would not give one inspector the power of doing it.

2490. One or two of the inspectors have suggested, that they should give notice to the proprietor if a mine was in very bad order, and desire him to alter it in the way they might suggest; and that if he refused to do so, an arbitration should be appointed. Do you agree that that would be a good plan?—I believe it would; I would not recommend that one inspector should have the power of stopping a mine. We suggested that there should be a number of sub-inspectors, whom the inspector should have the privilege of calling together, and that he should take counsel with them; and that he should, at the same time, have the power of calling some of the inspectors from another district, to take counsel with him also; and that if, after mature deliberation, they found that the mine was really dangerous, he should have the power of stopping it until the danger was removed; but I apprehend that a circumstance like that would seldom happen.

2491. In answer to question 1,062 of the Minutes of Evidence taken before the Committee of 1852, Mr. Darlington says, that your union is almost exploded; is that true?—No; the explosion has been at his colliery. On our present books we have better than 3,000 members.

2492. Your union is not established for the purpose of dictating to the masters any course that they should pursue?—No.

2493. Will you state shortly the purposes of your union?—One of the principal objects is, to get Government inspection of mines; and another is, to protect their wages.

2494. Have you got the printed rules of the union?—No.

2495. Mr. H. Vivian.] Are there printed rules?—Yes.

2496. Chairman.] Can you furnish the Committee with a copy of them?—Yes, I will send for a copy of the rules, and hand it in.

2497. Do you approve of the mode of increasing the number of inspectors, which has been suggested by Mr. Jude and Mr. Henderson?—Yes.

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2498. That is to say, you approve of the appointing sub-inspectors?—Yes.

2499. From what class of men do you think the sub-inspectors should be selected?—I think that the sub-inspectors should be selected from the most intelligent practical miners.

2500. Do you think that men could be selected from amongst the working men, sufficiently intelligent and sufficiently expert for the office of sub-inspectors?—I believe so. I believe that a great number of miners are directing their attention to that subject at the present time, and are doing a great deal to qualify themselves for such offices.

2501. Do you think that sub-inspectors should have a certain amount of scientific education?—I do not think that would be required for the sub-inspectors.

2502. You think that their being good practical men, and steady men, would be quite sufficient?—Yes.

2503. Do you think that such a class of men could be found, who would satisfy the owners of the collieries, as well as satisfy the workmen?—I believe so. I know that when the inspection was first appointed, there was great complaint among many of the masters in Lancashire. They were frightened, that the persons who were going to be appointed would not be practical men. The general complaint was, "We do not want chemists, or doctors, or railway engineers, lawyers, or anybody who knows nothing of pits; let us have somebody who understands the pits, and who will examine them; and then we do not care."

2504. Do you think that such a class of men as you have described would be rather more liable to be tampered with by the viewers or deputy-viewers of a colliery?—No; not if they were paid a liberal salary.

2505. What do you think is a liberal salary?—I think that if they had 250*l.* a year, it would be a liberal salary.

2506. Who is the inspector in your district?—Mr. Dickinson.

2507. Does he give satisfaction?—He gives great satisfaction to all parties, I believe.

2508. Have the working men confidence in him?—Perfect.

2509. And the owners of mines also?—Yes, for anything I know to the contrary; I know that a great many have, and I never heard any person say anything to the contrary. We have the greatest confidence in him.

2510. Having that confidence in him, you think it would be better to appoint a class of sub-inspectors under the inspectors, than to appoint a class of men of the same calibre and character as Mr. Dickinson?—Yes.

2511. You would not give the sub-inspectors the power of doing anything themselves?—No, I would limit their power.

2512. If they saw anything wrong, you suggest that they should report to the inspector, and that the inspector should himself visit the mine, and that if he had any doubt on his mind he should call in another inspector, and consult with him; and that if those two gentlemen agreed in the plan that ought to be adopted for improving the ventilation, or for the safety of the mine, the inspector should have full power to carry that into effect?—Yes.

2513. Mr. Baird.] You do not think it desirable that he should point out any particular method of doing it?—No; I have already said that he should only have the power of saying that a certain thing was required to be done, and leave the manager to adopt his own system of remedying the evil, only it must be done.

2514. Chairman.] You do not wish to take any responsibility out of the hands of the coalowner, or to interfere with him in any way further than is actually necessary for ventilating the mine, and keeping it in a state of safety?—We wish to fix the responsibility more closely on the master or manager; it sits very lightly on them at the present time.

2515. You do not wish to interfere with them in the mode which they may think is the best for carrying on their workings in the most economical and proper manner, provided they pay due regard to the safety of the men?—Not at all.

2516. How many sub-inspectors do you think would be necessary in your district?—We are perfectly satisfied that not less than five would be an efficient inspection.

2517. Do you think it is necessary that every colliery should be visited within a certain period?—The collieries in Lancashire and Cheshire vary. We have  
seams

seams of coal from 13 feet to one foot or 16 inches in thickness; and some of our mines are very fiery, and a great number have no fire at all in them. We have a great many where there are no shafts, and where they drive out of the hill-sides. Our mines vary so much, that I would leave the inspectors and sub-inspectors to determine which mines it was most necessary to visit.

2518. Do not you think that every colliery should be visited within a certain time?—No, it would take a great number of inspectors to do that.

2519. Would you limit their visits to collieries which they considered to be dangerous?—I would leave it to their own judgment, and they would soon find out where it was necessary to visit.

2520. Do you think it is equally important for them to visit collieries where the ventilation is bad, and where no other danger exists than danger to the health of the men?—Yes, it is quite necessary they should visit all; but I do not think it is necessary to visit those collieries as often as the others.

2521. In your district, are there cases of natural ventilation?—I know one such colliery, where there are nearly two hundred men employed, unless there has been a furnace put up since February 1852; there is no artificial ventilation at all.

2522. Is that colliery in a healthy state?—It is in a very unhealthy state.

2523. You think that, although no fire-damp existed, it was unhealthy for the men?—Very unhealthy; in fact, the black-damp is more fatal than the fire-damp.

2524. Are you of opinion that, by a legislative enactment, some system of artificial ventilation should be adopted in every mine?—In all mines, whether fiery or not.

2525. Since you gave your evidence in 1849, have you found that there have been any improvements in the management of collieries?—More attention has been paid to the air-ways and to the furnaces; and in some places, where there was no furnace, furnaces or fire-grates have been introduced. In mines with which I am acquainted, there has been some apparatus or another put up, for artificial ventilation, where there was none previously. The stoppings and doors have also been better attended to.

2526. Do you attribute that improvement to the inspectors?—Yes; I know that as soon as the Act was passed a great many of the overlookers received instructions to put the pits into repair, and attend to what was necessary; because it was said, "We shall be having these gentlemen among us very quickly, and you must get things into order immediately, for we cannot tell how soon they may come."

2527. You stated, in 1849, that you would not in any case enforce any particular mode of ventilation, but that you would rather require that sufficient ventilation should be afforded; is that still your opinion?—Yes.

2528. Supposing that by natural ventilation it was found that sufficient ventilation existed in a pit, and that a pit was perfectly safe and healthy, you would not by legislation enforce any further ventilation?—No; but natural ventilation is impossible, if a pit is worked to any extent; if it is only a small pit with ten men in it, no ventilation that I am acquainted with, supposing there is no fire-damp, can make it anything like healthy. I have left pits where the work suited me, with that exception, and where the air was so bad that my health was so injured that I was compelled to leave the colliery, and work in pits where there was better air.

2529. Mr. *H. Vivian*.] Assume that the air was not bad?—I am not acquainted with any pits in Lancashire, where we have not either fire-damp or black-damp.

2530. Assuming that was not the case, you would not bind people down to any particular mode of artificial ventilation?—That is a thing with which I think we are not acquainted; at least I am not acquainted with it, and therefore I cannot speak to it. In all mines that I am acquainted with, there is damp of one sort or another.

2531. *Chairman*.] Is there better ventilation at the present time than there was in 1849?—There is a general improvement. More care and attention is paid to the stopping, but not sufficient care and attention.

2532. Mr. *Cobbett*.] Do you attribute that improvement to the inspection?—Entirely.

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2533. *Chairman.*] You stated in 1849 that you did not believe too much air could pass through a mine?—I believe that also, now.

2534. Then you do not believe that (as some of the witnesses stated to the Committee of 1852), there could be too much air passing through a mine?—No.

2535. You never heard a collier complain of having too much air?—No.

2536. Did you ever hear him complain of the candle sweating?—Yes; but we can easily protect ourselves with a tin or wooden case.

2537. Mr. *Cobbett.*] How much air ought each man to have?—I perfectly coincide with Mr. Blackwell's Report of 25th March 1850, in which he says that each person ought to have 250 cubic feet per minute, supplied to him in mines which are not fiery, and up to 500 cubic feet per minute in mines which are very fiery. I believe that any less quantity than that is not sufficient to protect the health and lives of miners generally. I think that may be taken as something like a safe standard.

2538. *Chairman.*] Do you mean per man?—Yes.

2539. Mr. *Cobbett.*] Do you conceive that it should be made compulsory on the part of managers of mines to supply that quantity?—Yes.

2540. By legislative enactment?—Yes, I think it ought to be so.

2541. *Chairman.*] Do the colliers agree with the Report of the Committee of 1852?—They do generally, but there are some little things that we do not understand.

2542. Will you explain in what points you disagree with them?—We agree with them generally as regards the safety-lamp not being exactly the safe thing it is represented; we believe it is a very dangerous instrument, and that it has allured a great many people to danger and to death.

2543. Do not you believe, that if proper care were taken of the safety-lamp, it is safe, except under very peculiar circumstances?—I believe it is safe if proper care is taken; but there are so many "peculiar circumstances" connected with it, and there are so many ways in which it may become disarranged, that it is almost impossible it can be kept in a proper manner, for a man to work with it regularly without some of those peculiar circumstances happening to it.

2544. Mr. Jude and Mr. Henderson, in their evidence with regard to the safety-lamp, stated that in certain cases where the pits were very fiery, safety-lamps should be compulsorily used; they also stated that, provided it was necessary to use safety-lamps, it should be incumbent on the owner of the mine to have a sufficient number of men to take care of those safety-lamps, and keep them in order; and that it should be also incumbent upon them to have as many men as were required, whose special duty it should be to clean the safety-lamps, put them in repair, put oil in them, look after them, and keep the keys under their own care: with all these precautions, do you think that the safety-lamp is unsafe?—I quite agree with them in their remarks; but I believe that a safety-lamp is a very dangerous instrument to be trusted in the hands of workmen and boys. I do not consider it is any real protection, as the circumstances under which it may and does become disarranged are common, and not "peculiar."

2545. Have you seen the glass safety-lamp?—Yes; but I have not had experience of it.

2546. Do you consider it answers as well as the Davy lamp?—Yes; to the common Davy lamp.

2547. Is your great objection to the Davy lamp, that it is liable to explode, if a blower or a current of air passes through it?—Yes.

2548. Provided a lamp were invented which prevented a blower or any air passing through it, and gave sufficient light to the workmen, would your objection be removed?—I believe that, generally, the safety-lamp has a tendency to give confidence to the men and the masters that it is a safe instrument, and that they have neglected a great deal of precaution which otherwise would have been taken.

2549. Mr. *H. Vivian.*] Assuming that the colliery is well ventilated, do not you consider that the use of the safety-lamp would make that colliery more safe than the use of naked lights?—In case of a sudden outburst of gas, or any sudden irruption of that sort, it would make the colliery more safe.

2550. Are there not always points in a colliery, however well ventilated it may be, at which a naked light would cause an explosion?—I believe that may be

be the case in some collieries; but I do not know that if a colliery was properly ventilated it could be the case. I believe all parts of a mine, except the goaves, can be sufficiently ventilated without there being real danger.

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2551. Mr. Stephenson.] If a fall should take place in the goaf, would not the fire-damp be expelled into the working parts of the mine; and if candles were used, would not an explosion inevitably take place?—Undoubtedly.

2552. In such mines, would you not take the precaution of working with safety-lamps?—Yes; in the immediate neighbourhood of the goaf.

2553. Chairman.] Provided every care were taken to ventilate a colliery in the most efficient manner, does your answer apply to the safety-lamp, or is your answer confined to the opinion that the use of the safety-lamp encourages the owner of a mine to pay less attention to ventilation than he otherwise would?—I believe that if a mine is properly ventilated, a safety-lamp is not required, except in the neighbourhood of the goaves.

2554. Mr. H. Vivian.] May not certain irregularities, which it is utterly impossible for any human foresight to provide against, render a portion of the mine explosive?—We have read of that in the north of England, but I never heard of an instance in Lancashire and Cheshire.

2555. Your remarks apply to your own district?—Yes.

2556. You have no experience in large fiery mines in the north of England? Not at all.

2557. What is the largest production of coal from any mine with which you are intimately acquainted?—I should think that the Ince Hall collieries are producing as much coal as any mine in Lancashire; there are firms which produce more, but they have more shafts.

2558. What does the Ince Hall colliery produce?—I cannot say exactly.

2559. Two hundred tons a day?—More than that a great deal, from one shaft; but I would rather not speak on that subject, because although I have often been at the Ince Hall colliery, it is no portion of my business to inquire into that subject.

2560. Chairman.] Do you think it is possible to put down bore holes, and maintain bore holes on the goaves?—I think it is possible to put down bore holes, but I do not think it would be wise to do so.

2561. It is not a system you would recommend?—No.

2562. Then in that respect you do not agree with the Report of the Committee of 1852?—No.

2563. Do you agree with the Report of the Committee of 1852 as to refuge stalls?—I think it is very good if it could be carried out.

2564. How would you get the air to the refuge stalls, provided the brattice or the doorway were blown away by an explosion?—Although I am not going to advocate it, or say anything against it, the way in which I understand it is, that refuge stalls would be made something like a room at each side of the main air road, and that there would be some sort of door, the same as the valve of a pump, and that when an explosion took place it would bear on the valve, and the men would only have to open it and go through, and, as a matter of course, the room or stall would be full of atmospheric air, and that as soon as they got in the door would immediately shut, and keep the choke-damp out. If the room were large enough to supply the men with pure atmospheric air until they were rescued, it would be safe; but if it was not large enough, so that by continual breathing the air became impure, it would be no better than being in the other place.

2565. Have you ever calculated what space or area would support a man for a certain number of hours?—No; the refuge stall is a thing we have taken little notice of.

2566. Looking at the question in a practical light, do you think it would be possible to have refuge stalls?—It is a subject I do not understand.

2567. Mr. Stephenson.] Did you ever go into a colliery after an explosion had taken place?—Yes.

2568. Immediately?—Not immediately; I have assisted in making repairs after an explosion.

2569. Did you take air into the pit where the explosion had taken place, in order to extricate the men?—The rule generally, when the stoppings are blown down, is to get them up again as fast as you can, and take the air with you.

2570. When you came to the unfortunate men who were killed by the after-

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damp, did you find them very far from the place where they had been working?—In that case they were not far from the place where they had been working, because the explosion was a very serious one.

2571. Were the men burnt?—Yes.

2572. *Chairman.*] Do you think that more efficient means than refuge stalls could be adopted in mines?—I am not aware of any; if the refuge stall is made sufficiently large, it is quite possible that it may be of use; but as it is a subject which has never come before the men, and I have not paid attention to it, I would rather say nothing about it.

2573. *Mr. Locke.*] Supposing that refuge stalls were found to be efficacious, in your judgment how far ought they to be from the place where the men are working?—In many cases we have found that the men have got a long way from the place where they have been working; for instance, at the Ardsley Main, near Barnsley, I was sent over by the men from Lancashire to attend an inquest, and I made full inquiries into the matter, and I attended the coroner's inquest with an attorney on behalf of working men, and I found in that case a great number of the men had got a long way towards the pit shaft; in fact, many of them were very near at the shaft.

2574. Were those men killed by the after-damp?—Yes, and they were not burnt at all.

2575. Is it your opinion that, if refuge stalls had been made, those men might have been saved?—I cannot offer an opinion upon whether they might or not have been saved.

2576. If any refuge stall had been placed near where the men were working, do you think that they would have been as likely to be destroyed?—There might have been a probability that if there had been a sufficient space to hold any quantity of atmospheric air, some of the men might have been recovered.

2577. Do you know how many men were destroyed in finding their way towards the shaft?—Seventy-three were killed in the whole; I think that something like nineteen were found altogether, but very few of them were found in the boards; in fact, they had no boards there; they were found in the workings; there were very few of them who could not have got into the air-passages, if there had been any.

2578. *Mr. Stephenson.*] Were they on the up-cast side, or the down-cast side?—The up-cast and the down-cast were both together; I cannot say whether they were in the return air-way or the intake.

2579. *Chairman.*] How long was it before any fresh air was brought into the working?—The pits were so near together, that the partition between them was blown down.

2580. *Mr. H. Vivian.*] That was a brattice shaft?—There were two shafts; they were very near each other; and when the explosion took place it blew a hole right through.

2581. It blew a hole between the two pits?—Yes.

2582. Where no hole existed previously?—Yes.

2583. Then it blew the rock down?—I think it was soft metal.

2584. It blew the metal down between the two pits?—Yes.

2585. Assuming that explosion had taken place, and that the ventilation had continued round the mine and air-ways, although the bratticing in the stalls might have been blown down, would those men have been destroyed?—The great majority of the men would have been saved at that time.

2586. Then in your opinion, the main point is, to prevent the possibility of the main current of air being stopped in a colliery?—Yes.

2587. In the majority of explosions, does the great loss of life occur from main doors or other stoppings, between the intake and the return current being destroyed, whereby the passage of the fresh air round the remote workings is prevented?—I believe that is the case.

2588. So that it is desirable, as far as possible, to avoid such weak places in a colliery as main doors?—Yes.

2589. May that be done by a wall carried out to stop the working?—That might be done by having a shaft at the extremity of the working.

2590. Or by coursing in the stone?—Many of the heavy explosions, unless they went a good way above or a good way below, would find their road to the weakest places.

2591. They

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2591. They might be 10 yards or 15 yards?—Yes; I believe that less than that would be sufficient to protect them from being blown down.

2592. *Chairman.*] Another point in the Report of the Committee of 1852 is, that by an instrument called a self-registering anemometer, the inspector would know at each visit the rate at which the current of air had been passing through a mine in his absence. Have you any knowledge of the anemometer?—I know something about it. It appears that it cannot be moved sufficiently to give any certainty. There is a great deal of difference in them; and they have not sufficient delicacy in them to be a test of the real quantity of air passing along.

2593. Supposing an anemometer were made with the greatest delicacy, do you think that a dishonest viewer could, if he pleased, deceive the inspector by passing the air through a smaller place, and making the anemometer go faster than the ordinary rate of the current of the mine?—Yes, that could be done; but I do not apprehend that would be generally done.

2594. In that case you would not make a self-registering anemometer a test of the ventilation, and a register for the inspector?—No; in fact I do not think, with the experience I have had of it, that it can be made any test at all.

2595. You stated in 1849, that you did not perceive any use in splitting the air into different currents; have you altered your opinion in that respect?—My opinion has undergone some little modification; I should wish to have a good current of air all round the working, and at the same time I should wish to limit the extent of working in each shaft.

2596. Did your answer apply to having more shafts, more intakes, and more up-cast shafts?—Yes.

2597. Provided it was not possible to have more than a certain number of down-cast shafts and up-cast shafts, in your opinion would it not be better to split the air into different currents, so as to give every man in the mine as much as possible a current of fresh air for him to breathe, and that had not been used by the other men?—I think that each man ought to have his own proportion or share of fresh air.

2598. That answer involves splitting?—Yes; but not exactly splitting in the way it is generally carried on.

2599. Will you explain why it does not involve splitting in the way it is generally carried on?—The way in which air is split generally in Lancashire is, that as soon as it gets down to the bottom of the down-cast shaft, it goes along a principal road, and then it branches off to one portion of the district and ventilates it, and then returns; and so it is in all the various districts.

2600. And the same current ventilates the whole district?—Yes.

2601. In that case the air is not split at all?—Yes, there may be ten splits; there may be ten districts in a pit.

2602. *Mr. Locke.*] If that is the practice in Lancashire, how do you accommodate all those ten districts without splitting the air?—In one pit in Lancashire with which I am acquainted, there are ten splits. It is quite possible that there may be in one district 10 or 40 men, and it goes the round of the whole of the men; so that, when it comes to the last, the air is loaded with the gas which is taken along with it, and is almost unfit for the men to live in.

2603. You have been understood to state, that you thought all the men ought to have an equal share of fresh air?—Yes.

2604. Would that state of things enable the last man to get his fair share of fresh air?—Yes.

2605. You stated that the air was scarcely fit for him to breathe?—I mean in the way it is practised now.

2606. How would you avoid that danger, without splitting the air?—Supposing there is a district where there are 40 men; the way we work in Lancashire is best laid out in Mr. Blackwell's plans; that is, the air is coming up the main air-way; and, provided there are ten men working up one set of bays, I would take one portion of the air to those men, and let it ventilate the place in which those ten men were working, and immediately return back; and when it gets to the next set of bays, one portion taken off to them, and immediately let it go back to the up-cast; and so on with the third and the fourth.

2607. What is the difference between that mode and the present mode of splitting the air?—The present mode is, that it begins with one and goes the whole round of the district.

2608. In those cases there are several districts?—Yes.



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2609. Supposing that those who advocate the splitting of air were to have ten men in a district, you would then be under precisely the same circumstances?—Yes.

2610. Then, in point of fact, your mode of dividing the 40 men into companies of 10 each, and giving to each a portion of air, is splitting it into four portions?—Yes; but it is not taking the whole to every one of the men.

2611. Mr. H. Vivian.] It is not coursing the air?—No.

2612. Mr. Stephenson.] Do you mean that in some of the Lancashire collieries the air first passes into one bay, then into the second, and the third, and the fourth, and so on to any amount, before it returns to the up-cast shaft?—Yes.

2613. Are there any large collieries in Lancashire so worked?—There are some, if we must rely on the maps and plans; and the men tell me that it is the fact.

2614. You do not know it of your own knowledge?—No.

2615. Have you ever worked in a mine, where the air passed out of one bay into the other, and so on through the whole mine?—Yes.

2616. In a large mine?—A mine with 30 or 40 men.

2617. Is it not very important to draw a distinction between a system which is applicable to a large mine, and one which is applicable to a small mine?—Yes.

2618. With 30 or 40 men in a pit, what quantity of coals would be raised per day?—On an average, a man would get from three to four tons a day.

2619. Chairman.] In order to carry the air well through the workings, is it your opinion that great care should be taken to have sufficient air-ways?—Yes; I think that is a very important point.

2620. Have you formed any judgment upon what should be the area of the air-ways?—I believe that the area of the air-ways in no place ought to be less than either of the shafts.

2621. Mr. H. Vivian.] Some of the air-ways?—All the air-ways included. Of course the first intake air, previously to the air being split, ought not to be of less area than the down-cast or the up-cast. Of course they are not compelled to take them in one road; they may have two or three, if they please; but it ought to be compulsory that they have sufficient when it is split, they should still have the same air as before; if it was split in ten different parts, they might have a split one-tenth less than the first intake.

2622. Should the addition of the areas of the whole intakes be at least equal to the area of the shaft?—Yes.

2623. Chairman.] Do you think there is at present sufficient care to keep the diameter of the air-ways sufficiently large?—I believe they are too small generally.

2624. Do you think that the air should pass through the goaves, or that the goaves should be kept closely stopped?—I think that the air should pass through the goaves, if it is possible; but I do not see how it is possible at all times, and under all circumstances.

2625. Do you think that the goaves should be tightly stopped, and sufficient air go round them to drive away any foul air which might escape out of the goaves?—I do not agree with trying to keep the gas in the goaves at all; I think it ought to be got out as soon as possible.

2626. Did not you state that it was impossible to ventilate the goaves?—I am not aware of any means at present of ventilating them properly; but there are means whereby it may be drained off to a considerable extent.

2627. Are you not aware that a certain quantity of air admitted into the goaves, which would not properly ventilate them, would have a tendency to render them much more highly explosive than they would be if no air went into them?—I am aware that coal-pit gas will not explode, unless it is mixed with a certain quantity of atmospheric air.

2628. Admitting, as you do, that it is impossible to clear the goaves of gas, is it not your opinion that it would be less dangerous to stop the goaves as tightly as possible, to prevent any atmospheric air passing, than to let an insufficient quantity of air in to clear the goaves entirely?—Yes, if there were any means whereby they could be stopped up; but I do not know how that could be done, because when the men are getting the pillars, or anything of that sort, they are compelled to have the goaves open. When a district was worked out, they might make it clean off, and then I should have no objection to its being made clean off; but so long as the men are working on the edge it cannot be done.

2629. As



2629. As you say that it is impossible to ventilate the goaves thoroughly, do not you think it is better to endeavour as much as possible to keep the gas in?—No.

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2630. Would you allow a certain portion of fresh air to go in and mix with the gas in the goaf?—The best mode of ventilating a goaf with which I am acquainted is, that previously to the pillars being worked out there should be ample air road all round, and that a sufficient quantity of coal should be left to the rise of the return air road, and cut through it every 20 yards all the way round; and when the men are bringing the pillars back, if we drive a good air into the place where the men are working, it will naturally have a pressure upon the goaf, and have a tendency to work the gas out; in fact, the gas will rise of itself according to its own gravity, and will have a tendency to make its escape at the top, and the air pressing behind will have a tendency to assist it.

2631. Mr. Locke.] What is the extent of a goaf, generally speaking, in the Lancashire collieries?—We are getting some very extensive now.

2632. How large in width?—I can hardly speak to the exact size of them; but some of the pits embrace a great number of acres.

2633. How far are they working their mines in Lancashire away from the pits?—The very extensive mines they are generally working now on the north country plan, and therefore they may make them any size; there is no regular rule what size a goaf should be.

2634. On the Lancashire plan?—The pits are generally not very extensive, and the Lancashire plan is quite different from the north country plan.

2635. Where the goaves are extensive, and where they work on the Lancashire plan, are the pits a quarter of a mile or half a mile apart?—A great deal more than that.

2636. A mile?—I do not know. They are getting a vast quantity of acres to each pit.

2637. What is the distance that the air is carried through the working underground, where it is half a mile from the pit?—I have asked that question at some of the inquests, and the managers themselves generally do not know; they say that some of them are at a great distance.

2638. Have you any a mile long?—I believe there are some more than that.

2639. You do not know the width of the goaf?—No, I have often tried to get the length of air passages at coroners' inquests from the managers, but they seldom knew anything about it.

2640. Would not the plans of the colliery show it?—I do not know that they would, because many of them have no scale to them.

2641. Are not all colliery plans drawn to a scale?—I do not know that they are.

2642. Chairman.] How could they be plans at all, if they were not drawn to a scale?—I have seen some plans which had no scale to them.

2643. Mr. Locke.] Are they not drawn to a scale from which any person knowing the scale could measure for himself?—I do not know how they were drawn; I did not ask that; I know the scale was not on them.

2644. Mr. Stephenson.] Are you familiar with the mode of laying down plans of mines?—I am not familiar with making plans, but I understand a plan; and if I see a plan and see the scale, I can soon tell the distance, and so on.

2645. If you saw on a plan a series of bays, as you call them in Lancashire, would you be able, knowing the width of a bay, generally speaking, to get a scale, supposing you were a perfect stranger to the mine?—Yes, if I knew they were in the habit of having them 10 yards wide, and so on.

2646. Would not that be a very good standard for you to go upon, supposing, as you state, there was no scale put on the plan?—Yes.

2647. Chairman.] Do you think that the principal air-ways should be independent, and not used for drawing coals?—Yes; I think that the principal air-ways ought not to be interfered with for drawing coals.

2648. How many air-ways do you think there should be in a pit?—That is one of the things which ought to be left to the manager. I think that we ought not to say how many air-ways there should be, but that we ought only to say they should be of sufficient size.

2649. You would have the intake air-way, and the air-way for the return air, totally independent of the roads which are used to waggon the coals along?—Yes.

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2650. Mr. *Cobbett*.] When you say that the air-ways ought to be of sufficient size, is the rule that you go by the size of the shaft?—Yes.

2651. *Chairman*.] What ought to be the size of the shaft?—That depends on the quantity of men in the interior of the mine. Supposing that I was going to sink a pit and employ 200 men, I should have my shafts accordingly.

2652. Would that answer also refer to the number of shafts?—Yes.

2653. Mr. *Stephenson*.] Does not the quantity of air going down a shaft depend very much on the temperature of the up-cast?—Yes.

2654. Then if you are going to sink a shaft for a given number of men, must you first of all determine what furnace power you will make use of?—That is a principal consideration; but it is generally understood that there is a limited power to the furnace, and that we can get very little more than 1,000 feet per minute, per foot area. It is exceeded occasionally, but we take that as a standard rule.

2655. Would not that depend on the extent or the length of the course of air through the mine?—Of course; and upon the efficiency of the furnace; but where there is one pit which gets more than 1,000 feet per minute per foot of area, I think we may take it for granted that there are 100 which do not come up to that point by a great deal.

2656. *Chairman*.] Do you think there should be ever less than two shafts in a mine?—No.

2657. You think it should be compulsory on a coalowner to sink two shafts in his colliery?—In all cases.

2658. What number of acres do you think should be allowed for a shaft?—I think that something like 40 statute acres is quite enough to one shaft.

2659. Would not that depend, in some measure, on the nature of the seam?—Certainly.

2660. Mr. *Locke*.] Would the depth of the mine alter the circumstances at all?—Certainly, it would cost more to sink another shaft where the mine was deeper.

2661. Do you know, in the north of England, what distance or what area they generally work from a mine 300 yards deep?—They work great quantities, and far more than is safe.

2662. Do you think that one of the disadvantages of the north country system is, that they work too far from the first shaft?—Yes.

2663. Would you limit them to 40 acres in a pit of that kind?—Not in a very deep pit like the Monkwearmouth, but generally speaking, for all useful purposes, and particularly in the Lancashire coal-field and the Yorkshire coal-field, they will not come to anything like 200 yards; and on the average, in coal pits in Lancashire, second shafts are sunk very cheap.

2664. What do you mean by "second shafts"?—We should have two shafts to the dip; after we had worked nearly our quantity, we could hollow the other, and supposing there was any water troubling us, we could bore it down; we should have a pumping-engine at the dip. Sinking a second shaft is altogether different from sinking a new pumping pit.

2665. Do you know what is the expense of sinking a second shaft?—I would say 1,500 l. for a shaft 200 or 220 yards deep.

2666. *Chairman*.] Your evidence is confined exclusively to your own district?—Yes.

2667. Mr. *Locke*.] The pit at Monkwearmouth is 500 or 600 yards deep?—Yes.

2668. To what extent, in such a mine, would you permit men to work in the same shaft?—In a mine like that, I can hardly state. There is a great deal connected with that mine; but the sinking of another shaft, supposing that any great quantity of coal is got, would be better.

2669. You have considered this question?—Yes.

2670. What distance would it be necessary to work from the shaft in any one direction, in order to get 40 acres for a pit standing in the middle of it?—That would depend entirely on the shape of the coal.

2671. Supposing that all things were favourable, do you recollect what must be the length and breadth of a colliery, to enable you to work 40 acres?—Supposing that the coal laid all to the rise, and spread out on each side, sinking the pits on each side of it would be no great distance to go across it.

2672. How far?—It is quite possible it may not be above 500 yards in a case like

like that; at the same time, it is quite possible that if the royalty was narrow, and extended out as some do, it might be more than a mile in some cases.

2673. Can you state how much it would take in width to make up 40 acres, with only 500 yards away from the shaft?—No, not at the present moment.

2674. Are you aware that the coal would be more than 100 yards wide?—Yes; I should fancy that it would be a great deal more.

2675. Perhaps it would be 200 yards wide?—More than that, a great deal.

2676. How much do you think it would be?—I cannot say just now, but it would be somewhere near 400 yards.

2677. What would be the width of a working in a colliery 500 yards long, in order to make 40 acres?—I have said that I do not recollect just now; it may be easily calculated.

2678. According to your notion, a colliery which is working 500 yards long, might be worked with safety; and you think that a colliery of that kind might be worked with equal safety 200 or 300 yards in width?—Yes.

2679. And you think there are cases where, with perfect safety, a colliery might be extended more than 500 yards from the pit?—I do not think it would be safe; nor is it the interest of proprietors to do so.

2680. Are you prepared to state, that you would limit all coal proprietors from going more than 500 yards?—I do not know that I would limit them, because it would depend on the width of the coal.

2681. Supposing it was a very large coal-field, and you were not restricted, what distance ought a colliery proprietor to be entitled to work from one shaft, before he was obliged to sink another?—I do not know that we could say exactly the distance.

2682. I put the question to you before in reference to the 500 yards?—I think that 500 yards would not be the average, taking all the coal-fields.

2683. *Chairman.*] Each side of the shaft?—Yes; straight forward.

2684. Supposing that 500 yards long by 200 yards wide, instead of representing 40 acres, represented 150 acres, you would not find the same objection?—No, but it does not represent anything of the sort.

2685. Then your answer as to 40 acres may be taken as qualified?—Yes, so far as 500 yards straight ahead goes.

2686. *Mr. Stephenson.*] Do you know the Ravenhead colliery in Lancashire?—Yes.

2687. Is it an extensive colliery?—I cannot speak to that; it is a colliery which has been working a long time, and there are a good many men employed in it.

2688. Do you know that in that colliery they are now working coal at a distance of 2,600 yards from the shaft?—No; none of the men ever told me that.

2689. Have you ever made any inquiry about that?—No.

2690. Do you think it would have been useful information for you to have known before you gave your opinion as to 500 yards from the shaft being the limit of safety; that there are mines in your own district in Lancashire where the coal is worked 2,600 yards from the shaft without any great danger?—I do not know that they are working there without any great danger; I can tell you something about the Ravenhead mine.

2691. Would the knowledge of that fact at all modify your opinion respecting the distance at which coal might be worked from the shaft?—No.

2692. Do you remember any accident at that colliery within the last few years?—No.

2693. Would not that fact rather tend to modify your opinion about the test of safety?—No, it would not.

2694. Would not the fact that the colliery has been worked for several years without any serious accident, and that coal is now got at a distance of 2,600 yards from the shaft, modify your opinion?—No; there is one thing which I wish to state about the Ravenhead mine. The men have often complained to me about the ventilation in many parts of the Ravenhead mine; they never told me the extent of the mine, but I have heard of a great number of complaints. In some parts of that mine the old goaf was on fire, and a good deal of nauseous gas was given off, and they had not sufficient air to make it anything like healthy for the men to work in it.

2695. Is there any fire-damp in that mine?—I think there is.

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2696. If that mine has been worked for several years without accident, in spite of fire-damp, would not that fact rather influence your opinion about the extent of safety?—No.

2697. The fact of the existence of fire-damp in that mine, and its having been worked for some years without accident, would not influence your opinion about the distance at which coal may be got from the shaft?—It is possible that it may have been free from accidents, and yet have been on the verge of them every moment; my plan is rather to prevent the occurrence of accidents.

2698. In this particular colliery, as you state, accidents may have been very near, but they may also have been far off; you do not know the condition of the colliery, and, therefore, you must not make the assumption that it has for years been on the verge of an accident?—I have stated one condition of that colliery; that is, that it is in a very unhealthy state.

2699. Have you been in the colliery?—No, but the men tell me whether the mines are healthy; and therefore in my official capacity they have told me that the mine was not healthy, and have complained to me personally about it.

2700. Mr. Cayley.] What is its effect upon them?—On account of the black-damp and the burning of the old goaf, there is not sufficient air to carry it off; and the men complain very much indeed.

2701. This mine seems to be full of choke-damp and fire-damp?—The men have complained very much of it.

2702. The choke-damp is that which affects their health?—Yes.

2703. Have you ever heard them say whether it was very fiery?—No.

2704. May it be more or less fiery?—Yes.

2705. If it were less fiery, would there be less chance of an explosion taking place?—As a matter of course.

2706. And still it would be very unwholesome for the men to live in it?—Yes.

2707. Chairman.] You have stated that in your opinion a second shaft, from 100 to 150 fathoms in depth, could be sunk for 1,500*l.*?—Yes.

2708. To what district were you alluding?—The Lancashire and Yorkshire districts.

2709. Have you been practically acquainted with the sinking of shafts?—A little; I once worked for six months in sinking shafts.

2710. Mr. H. Vivian.] Did you ever see an owner's account of the cost of a 100 fathom shaft, made up?—I know what the workmen receive, and I have a good notion of what the other labour and material costs.

2711. To what size shaft are you alluding?—Ten or eleven feet diameter.

2712. Do you know, of your own knowledge, of any shaft having been sunk at the price of 10*l.* a fathom?—Yes; 10*l.* a fathom would sink a second shaft, on an average, including all materials.

2713. Mr. Stephenson.] You have stated that you attach very little importance to the Davy lamp?—Yes.

2714. Do you know any well authenticated instance where an explosion has been traced to the Davy lamp?—I know a case where a fireman was in the pit by himself, and an explosion took place; he said he was travelling the air-roads with the safety-lamp.

2715. Did he escape?—He was very badly burnt, and he is a cripple, and will be so all the days of his life.

2716. Mr. Cayley.] No one else was in the mine?—No one else was in the mine.

2717. Was the lamp locked or shut?—Firemen always have keys, so that if they are locked they can unlock them; we have only his own word that the lamp top was on.

2718. Mr. Locke.] Was the man badly burnt?—He was badly burnt.

2719. Was he afterwards discovered in the mine?—He was able to get out himself.

2620. Did he bring his lamp with him?—Yes.

2721. Did he ever tell you that his lamp burst, or exploded, or was injured?—No; it was neither burst nor exploded.

2722. Then, in point of fact, according to the appearance of the lamp, there was nothing the matter with it?—According to the appearance of the lamp, it was all perfect.

2723. And

2723. And you believe that the explosion arose from the lamp?—I have only his statement for it.

2724. You state that the lamp was in a perfect state when it was filled?—It appeared to be perfect, and I believe that the explosion did take place with the lamp; I have no reason to doubt the man's veracity.

2725. You have given this as an illustration of an explosion which actually took place from the lamp; and you do it from the fact that there was no other person in the pit than the man who was carrying the safety-lamp?—Yes.

2726. You assume there was no other light in the pit than that safety-lamp?—Yes.

2727. Do you believe that explosion took place from the lamp, the lamp being in a perfect state?—I believe it took place with the lamp, but whether the lamp was in a perfect state or not I cannot say.

2728. You were understood to say that when the man brought his lamp out of the pit it was in a perfect state?—To all appearance, it was in a perfect state.

2729. Mr. Cobbett.] Did you examine it?—No.

2730. Mr. Locke.] Did anybody examine it?—Yes; the man said that he believed his lamp was perfect, and he says so now; I know nothing to the contrary.

2731. Did the man believe himself that it took place with his own lamp?—Yes.

2732. Chairman.] Did he say that he had not taken off the top of the lamp?—Yes.

2733. Do you think that he would be afraid to tell you if he had taken off the top of the lamp?—He could have no interest in trying to deceive me, because all these things are generally told me in confidence.

2734. Would not the other workmen, if they knew he had taken off the top of the lamp, be very much annoyed?—They would have been very much alarmed.

2735. Mr. Locke.] Do you know of any other case?—No.

2736. Then from that one case you think the Davy lamp is unsafe?—I believe it from demonstrations which I have seen; for instance, if we take the Davy lamp at the common gas, if it is on at a high pressure it will explode; I have seen it exploded a hundred times with a common gas burner.

2737. Mr. H. Vivian.] At a very high pressure?—Supposing there is a common gas burner, you can explode the Davy lamp.

2738. Would there not be a strong current of gas rushing through the lamp?—Yes.

2739. Are you aware that the inventor of the Davy lamp stated, when he brought the lamp out, that such was the case?—I have seen that, and the first time I saw it, it alarmed me a great deal; I had perfect confidence in the Davy lamp previously to that; and when I saw it in a private dwelling experimented on a hundred times in that sort of way, my confidence in the Davy lamp was entirely shaken, and is so to this day.

2740. Is such a condition likely to occur in the ordinary practical working of collieries?—Yes.

2741. Do you think that in collieries gas will issue at the velocity at which it issues from a gas burner?—Supposing that gas does not issue at that velocity, there are other circumstances which may arise.

2742. What are those circumstances?—Supposing that a man was working in a straight place, and he was not aware that the lamp was full of fire, and when he turned round he saw that his lamp was full of fire, and he incautiously took his lamp and pulled it quickly to him at a quicker pressure than the lamp was able to bear, an explosion might take place.

2743. Chairman.] Supposing a man had been in that place with a naked candle, what would have been the result?—The man would have been burnt.

2744. Then, in that case, would he not have had more chance of being safe with the Davy lamp than with a naked candle?—Yes; supposing there is a sudden fall from the roof, which causes the gas to travel above a certain rate, the lamp will explode. It is quite possible that the most careful man, when he is cleaning his lamp, may just disturb one of the wires; and if one of the wires is knocked a little out of its place, and the lamp fills, it is perfectly insecure.

2745. You were asked, in the early part of your evidence, whether you did not think it necessary, if safety-lamps were used, that one man should be employed

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at the top of the pit; or if one man was not sufficient, that a sufficient number of men should be employed, whose exclusive duty should be to clean the lamps, examine whether they were in proper repair, and to repair them if they were not in proper repair; you were understood to state that that was necessary?—Yes.

2746. And being necessary, would it not be likely to obviate the objection you state, as to the wires being out of order?—No; because a little bit of coal or anything else might disturb one of the wires; and then, again, safety-lamps are generally put into the hands of young boys. Supposing I was a collier, and had a boy, I would take him into a pit, and the safety-lamp would be put in the boy's hands, and the boy would know nothing about it; labourers come over from Ireland, or any one else, and the lamp is put into their hands; they know nothing at all about it. The lamp is a very delicate instrument, and ought to be used with great caution.

2747. Are the Committee to understand that if you could not work a pit with candles, that you would stop the pit?—No.

2748. Supposing you could go into a pit, and work it with safety-lamps until sufficient air was got to make the pit pretty free, would you recommend working with safety-lamps, or a cessation of working altogether?—I would recommend working with safety-lamps, but with very great caution.

2749. Then are the Committee to take your evidence merely to the extent, that safety-lamps are advisable only with the greatest caution?—Yes, with the very greatest caution.

2750. *Mr. H. Vivian.*] And that they are not to be relied on?—No.

2751. And that the best ventilation is to be kept up, which it is possible to keep up, but that as an additional means of safety, it is your opinion that the safety-lamp ought also to be used in fiery mines?—Yes, near the goaves.

2752. *Mr. Cayley.*] Was the man whose lamp ignited, a fireman?—Yes.

2753. Is it not the business of a fireman to precede the workmen in a pit, in order to test its safety?—Yes, he was doing that.

2754. Would a fireman have any object whatever in taking off the top of his lamp, if he was going on an exploring expedition, merely to test the safety of the mine?—I know of none.

2755. And therefore you are still of the opinion which you have gathered from the man, that there being no other light in the mine the Davy lamp did not prove a sufficient security against explosion?—Yes.

2756. *Chairman.*] Did the man state that he was walking very fast?—No.

2757. Did he state that he met with any extraordinary current, or any blower?—He was walking against the current at a moderate rate.

2758. *Mr. H. Vivian.*] You have stated that the derangement of a single wire in a lamp would cause an explosion?—Yes.

2759. If, instead of having a Davy lamp, he had had a candle, would there have been an explosion?—Undoubtedly, unless he had examined the mine; but if he had been going with a candle, he would have tried it here and there.

2760. *Chairman.*] Is it not the fireman's business to try with the Davy lamp whether the fire ignites or not?—It is seldom they do so in the main air-passages.

2761. If you were an over-man or manager, would you keep a man to go into and examine the mine, who did not try whether there was fire in the main air-passages?—No, I should think he ought not to be kept there.

2762. *Mr. Stephenson.*] In what particular colliery did this take place?—It took place in one of the collieries near to Bolton.

2763. *Mr. Locke.*] How long ago?—I can hardly state exactly; it is a few years since.

2764. *Mr. Stephenson.* You have stated, in the course of your evidence, that there has been a great change in the management of collieries in Lancashire, since the appointment of inspectors; and you also added, that at the time when the inspectors were appointed, a great stir was made among the proprietors, and that they used the expression "We must now get things into better order, for these men are coming down." Can you name any one who said that?—Yes, I can name several; but it is not necessary to do so.

2765. You heard them yourself?—Some; the underlookers told me what instructions had been given to them; and I know that some of the masters are now getting boys and young men educated; and I know one master in particular,

lar, who has two or three boys who go along with the overlooker; so that they are being brought up to the business.

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2766. Mr. Locke.] In the mines?—Yes; and all that has been occasioned by the present inspection being appointed.

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2767. Mr. Stephenson.] You have also stated, that the responsibility sits very lightly upon the proprietors of collieries?—Yes, it does.

2768. When any serious accident occurs, are you not aware that the expense is very great to the proprietors?—It is very great, I believe; but, however, a man's life is more valuable than all the expense that they are put to.

2769. Would not the fact of a proprietor feeling that he had the lives of so many men in his hands induce him to be very careful?—We fancy it ought to do so; but in many cases it does not do so.

2770. Mr. Locke.] Then, in point of fact, the proprietor does not look to his own interest?—That is my opinion.

2771. Mr. Cobbett.] Has there been a difference, in that respect, ever since the inspector was appointed?—There has been considerably more care, but not so much as there ought to be. There is a considerable improvement for the better.

2772. Are the miners themselves satisfied of the fact which you have just stated?—They are.

2773. Are they satisfied that there has been greater caution since the inspector was appointed?—Yes.

2774. With reference to your own district, are there many mines which have but one shaft?—There is only one shaft in Mostyn Colliery.

2775. Mr. Mostyn.] Which colliery is that?—A colliery near Manchester.

2776. Chairman.] Upon looking at the returns, it is found that many accidents arise from falls of roofs and sides; in your district, is it usual for the collier to support his own roof, or are there men to do it, as there are in the Northumberland district?—Both plans are practised.

2777. Which plan is found to be the most efficacious?—The men setting their own props, and, as a matter of course, being paid for it. If the masters set the props, they take so much off each man. We generally had threepence a dozen in Yorkshire for propping; and it was considered better, and the men preferred to be paid for setting their own props; they considered that their lives were much safer.

2778. In general, in your district is sufficient timber furnished to the men by the proprietors of mines?—Yes, at the great majority of the collieries; but at some collieries there is not.

2779. In all the best managed collieries a sufficient quantity of timber is furnished to the men by the proprietors?—Yes; generally speaking it is the case, but there are exceptions.

2780. Do you think that the inspector should have the power of seeing that sufficient timber was furnished to the men?—I think that should be one of his duties.

2781. Did you hear the evidence which was given by Mr. Jude as to accidents in shafts?—Yes.

2782. Are you much liable in your district to accidents in shafts?—There have been several.

2783. Have all your shafts guides in them?—Not all, but principally.

2784. Do they go at a great speed?—We are not much troubled with great speeds in Lancashire, except at some few collieries.

2785. In point of fact, do you see anything defective in the general state of the shafts in your district, or do the workmen complain that they are defective?—I have often heard complaints of that kind.

2786. What do they complain of?—About the shafts not being properly walled. In many places they sink a shaft, and brick it at the top until they get to a solid foundation, and then they never put in any sheeting-board or anything, unless it is a mine which will not stand, until they get it to the bottom; in many cases they think that they are all right, if they can only reach the bottom.

2787. Is there any other complaint, except of the insecurity of the shaft itself?—We think that the enginemen ought to undergo some examination, and that they ought to be men who are qualified, and are really careful and cautious

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men, to wind men up and down collieries. Several men have been killed, as consider, through the negligence of the engine-tenters.

2788. Is it not the practice of the owners of collieries in your district to employ proper men to wind the men up and down the shafts?—They imagine they are proper men, but sometimes it turns out that they are not proper men.

2789. If a coalowner discovered that they were not proper men, would he not immediately dismiss them?—I cannot speak to that.

2790. Have you seen for any length of time, at any particular colliery, a man who was an improper man to be employed to wind men up and down shafts?—The men have often complained to me about young persons being employed, and that they did not feel that their lives were safe in their hands.

2791. Having received that complaint, what steps would you take?—We have no power of taking any steps, and the inspector has no power at the present time.

2792. Would you not report that to the inspector?—I do not know that I have had complaints about that since he was appointed; but there have been persons killed in Lancashire from the negligence of the engine-tenters.

2793. Since the inspectors have been appointed, what complaints have you received from the men?—As regards the engine-tenters, I have not received any complaint.

2794. You have only received complaints of the insecurity of the shafts themselves?—No; but still they are very desirous that the engine-tenters should undergo some examination. There have been many instances of men who were colliers, when they had done their work in the evening, going to an engineer and giving him a trifle to learn them to tent an engine; and in six months they would know how to handle an engine very nicely; and if they had a friend at court, they would be put to the winding engine.

2795. If accidents occur to the rope or machinery, is not the owner put to great expense?—Sometimes; if the guides are in good condition, a full tub may fall through to the bottom, without doing much damage.

2796. Do you think it is one of the duties of an inspector to see that proper engine-men are appointed, and also that the pits are walled, and in a safe condition?—Yes.

2797. Is it the custom in your district to let a man down while a full waggon of coal is going up the pit?—Yes, generally.

2798. Do you think that is safe?—No; it ought to be abolished.

2799. You think that ought to be prohibited by legislation?—Yes, under all circumstances.

2800. Mr. Locke.] Do you recollect any instance of death arising from stones falling out of the side of a pit?—Yes.

2801. Where?—I recollect a man being killed at Ardsley, near Wakefield.

2802. From a stone falling from the side of a pit?—Yes; his name was Taylor.

2803. What was he?—He was a hanger-on.

2804. Do you know of any accidents which have arisen in Lancashire?—Not where anybody has been killed, but I have known several men to be wounded.

2805. You were understood to state in an early part of your examination, that there were not many accidents of that kind?—There may be accidents, and yet not fatal.

2806. The question is not confined to fatal accidents, but it applies to accidents where men have been struck by stones falling; can you name any others?—I know that a man not long ago had his hand on a tub, and a piece fell down and disabled his hand.

2807. Was that a stone from the side?—Yes.

2808. It did not come from the top?—No, it came from the side; many of the sides of the shafts are very bad.

2809. Do you recollect in what pit that happened?—I cannot think of the name just now; I have known of several instances of people falling down ladders as well.

2810. You recollect one case where a man was killed at Ardsley, and another case of a man having his hand hurt by the fall of a stone?—Yes.

2811. And you know of other cases, but you cannot mention them?—Yes; the man had his second finger split in two.

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2812. *Chairman.*] Are you aware, that by Act of Parliament boys are not allowed to wind men up and down pits?—I am aware of that; and I think the age out to be extended.

2813. What is the present age?—Fifteen years; I think that no person ought to be permitted to wind up and down shafts, who is under 18 years of age.

2814. *Mr. Stephenson.*] Do you think that inspectors ought to have the power of determining whether a sufficient quantity of timbering was used in collieries?—I do indeed.

2815. Does your answer refer to permanent timbering, or to temporary timbering?—It refers to all kinds of timbering; but more especially to temporary timbering.

2816. Does not the temporary timbering vary from time to time?—Yes.

2817. How is the inspector therefore, unless he is constantly in the mine, to give an opinion about the sufficiency or insufficiency?—When he does go in, he can give an opinion upon it.

2818. Do you think that inspectors when they are there, ought to have the power of condemning the existing timbering, and of ordering it to be replaced by sufficient timbering?—That is not exactly what I mean.

2819. Do you think it is possible, unless an inspector were there from day to day, that he could be of any real use as an inspector of the timbering?—If an inspector goes round the place, he will very easily see whether the men have sufficient timber set in their places, and whether they have timber laid by them, ready; and when he gets to the top of the pit, he would just go to the place where the timber for props was kept, and he would observe whether there was a proper supply of timber or not.

2820. *Chairman.*] Is it your opinion that if shafts were walled, such accidents as you have described would not occur?—They could not occur.

2821. Do you think it should be compulsory on the owner of a mine to wall the shafts?—Unless it was very good rock, which would not give way to the moisture of the pit or the heat of the pit.

2822. *Mr. H. Vivian.*] Do you include the walling of the pit in the 1,500*l.*, which you have stated as the cost of a second shaft?—Yes, on the average; because in many pits where there is rock, they would not be required; I do not mean to wall them from top to bottom.

2823. *Chairman.*] Do you think it should be in the power of an inspector to order pits to be walled, if necessary?—Yes.

2824. Are the men generally satisfied with the system of inquests, as they are at present conducted?—They are very much dissatisfied.

2825. Have they petitioned against them?—Yes; the principal objection of the men to the present system of holding coroners' inquests, is that the coroners are generally either doctors or lawyers, or persons who know nothing at all about the management of collieries; neither do they understand the technical words and terms which are made use of by the witnesses when they are giving their evidence; and they cannot comprehend what the witnesses are talking about.

2826. Are not the inspectors generally present?—The inspectors cannot always be present; they are sometimes present in urgent cases, and they are of great service.

2827. When they are present, do not the coroners generally pay great attention to what the inspectors tell them?—Sometimes.

2828. Have you known an instance of the contrary?—I have not known them to show any disrespect, but I have seen instances where I fancied they have not been particularly anxious that the inspectors should be very forward in putting questions.

2829. Have you ever been upon a jury at an inquest?—Yes, I have been at several inquests as a jurymen; and I have also been at a great number to watch the proceedings on behalf of friends of the deceased.

2830. *Mr. Jude* stated that the objections of men in his district was, that persons connected with the mines, such as a master-blacksmith, a master-mason, and persons of that kind, were on the juries; and that the workmen thought they had a bias in favour of the coal proprietors, and did not perform their duty efficiently?—We have the same objection.

2831. Provided the jury were selected from men who were independent of influences of that kind, would the same objection exist?—No.

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2832. Do you think that the law as it at present stands, which only enables a jury to return a verdict either of accidental death or manslaughter, is defective?—It is very defective.

2833. In what does its defect consist?—The verdict must either be accidental death or manslaughter, as the law is at present; and juries generally have a great aversion to finding a verdict of manslaughter. Many of the juries at the present time, supposing it is an agricultural district, are farmers and others who pay rates; and if they send a man to the assizes, they have not the least doubt but that he will be acquitted, and that it will be the means of entailing on the county a great expense, a portion of which they have to bear; and it is constantly said, "What is the use of sending a man to the assizes to be acquitted, and for us to get a blowing up from the judge for so doing?"

2834. Are the Committee to understand that you have attended coroners' inquests in your official capacity?—Yes, and as a jurymen also.

2835. *Mr. Locke.*] In the petition to which you have alluded, the objection which is stated, is not so much to the informality of the verdict as to the non-qualification of the persons who compose the jury; are you of opinion that the juries are ill composed?—Yes.

2836. You think that farmers, and petty tradesmen and others, are totally ignorant of the practical working of coal mines?—Yes.

2837. Do you think that the jury should be composed of persons who are practically conversant with coal mines?—Yes.

2838. How would you compose a jury to try a question of the kind?—I would have as a special coroner for all colliery accidents, a man who had been brought up in the mines, who had served his apprenticeship to a viewer or colliery manager, and who had received the very best education, and was a responsible man.

2839. Do you think that a Government inspector would be a proper person to be coroner?—I would not say a Government inspector, but a man of similar standing in society. I think that a Government inspector, so long as he held the inspectorship, as he might be a witness, should not be a judge.

2840. Do you think that a knowledge of practical mining is essential to the position of coroner?—I think that the one we have in Lancashire is the very sort of man who would do for the office, Mr. Dickinson; I think a man of his standing ought to be at the head of those inquests.

2841. *Chairman.*] Do you mean Mr. Dickinson the inspector?—Yes; but so long as they remain inspectors I would not recommend them.

2842. Would it not be necessary for him to have some knowledge of the law?—I think the law would be plain and simple, and that he would not have any doubt about it.

2843. However plain and simple, would it not be necessary for him to have a perfect knowledge of the state of the law?—He could devote some attention to that subject.

2844. *Mr. Locke.*] Do you think that if he had a knowledge of mining, he would be a great deal more useful?—A great deal. We have had too much law; we now want some justice.

2845. *Mr. Cobbett.*] You stated that you would have an inspector appointed as a coroner?—Men of similar qualifications.

2846. *Mr. Locke.*] Are you aware that all inspectors are not practical miners?—I am not aware of that fact. I have heard something about one inspector not being a practical miner, but as regards the truth of it, I have no certainty.

2847. At all events, whether an inspector was a practical miner or not, you would insist that men who held the position of coroners should be practical miners?—Yes; I believe that all the inspectors, with the exception of one, are practical miners.

2848. *Mr. Cobbett.*] Are you aware that usually, at the present time, a coroner is elected by freeholders?—Yes.

2849. Would you have the coroner for the coal mines elected by freeholders, or would you have him appointed by the Government?—I would have him appointed by the Government.

2850. Would you dispense with the jury altogether?—No; I would have one portion of the jury composed of persons practically acquainted with mines, and the other portion of independent parties.

2851. Then,

2851. Then, in point of fact, you would alter the present mode of summoning the jury?—Yes. Mr. D. Seaden.

2852. Is the jury at present summoned by the constable of the parish?—Yes. 4 July 1859.

2853. Are the jury taken from one parish, or from a number of parishes?—The general rule is with us, that supposing an accident occurs in our township, four gentlemen are summoned from each of the neighbouring townships on each side of us.

2854. Then hereafter would you have the jury summoned from the mines themselves, and from persons who were otherwise engaged?—Half the jury should be miners.

2855. Would you have any of the jury summoned out of the very mine in which the accident took place?—No.

2856. Do not you think that if you summoned persons from neighbouring mines, it is possible there might be some influence exercised over them by viewers or overlookers, such as has been stated with regard to accidents?—It is quite possible; but I do not think it would often happen.

2857. Do you think that the coroner should be a person acquainted with mining, and that half the jury should be acquainted with mining?—Yes.

2858. Do you propose to give that court the power to assess damages?—Yes.

2859. You propose to extend the power of the coroner to award damages in cases of accidents?—Yes, through gross neglect.

2860. Not merely to find whether the death arose from accident or from culpable negligence, and there stop, but to find what damage should be awarded to the survivors?—Yes, in case of death.

2861. Would you repeal the present law, by which the survivors can bring an action and recover damages, before one of the judges of the superior courts at Nisi Prius?—I think it ought to be enacted that the inspectors shall have the power of instituting proceedings for the recovery of damages in the case you are speaking of.

2862. Would you give them the power to institute the proceeding before a coroner which you propose they shall have the power to institute in one of the courts of law?—I should prefer the coroner's jury having the power of assessing damages, in addition to the present law.

2863. *Chairman.*] Is it your opinion that the magistrates or the inspectors should have the power of levying fines upon the owners of collieries who fail to perform their duty?—I think the magistrates ought to have the power.

2864. Do you think it would be better that the power should be given to the magistrates, or to the Secretary of State only?—I think it ought to be given to the magistrates. I do not see how the Secretary of State could be a judge upon the matter, because the master would have no chance of being heard.

2865. At present, is there a power to prosecute workmen who uncover their lamps in dangerous situations, or who commit any other reckless act?—Yes.

2866. Is it often the case that workmen are reckless?—There are a great number who are reckless, but they are persons who have been introduced into the mines; they are not persons who have been brought up to mining under the tuition of their father or relatives, or persons who have generally been taught the responsibility; they are generally persons who have been introduced into the mines as other kinds of labourers.

2867. If a man was found committing a reckless act, so that he endangered the lives of his fellow-workmen, would the workmen object to work with him?—Many of the men would complain of him.

2868. To whom would they complain?—They would complain to the manager.

2869. Have you known instances of such complaints being made?—Not specially to the manager; but I have often heard them talking among themselves that such a man had taken his lamp-top off.

2870. Did the men at the same time state that they had made complaints to the overman?—No.

2871. Is it your opinion, that provided such a complaint were made to the overman, the overman would take notice of it, and immediately send the man out of the pit?—I believe he would.

2872. Do you think it is desirable that there should be a specific enactment with reference to the carelessness of workmen?—I think the law is severe enough at present.

2873. *Mr. H. Vivian.*] Is the law sufficiently special at present?—If it can be

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be proved that a man has been guilty of the act, he is generally committed. I am not aware that they have much difficulty at the present time. There was considerable difficulty a few years ago; but the decisions have become very general, although the law is not very pointed upon it.

2874. Would not a material effect be produced on the men if there were a specific enactment against that description of carelessness?—Yes; supposing that the present law, which is rather doubtful, were defined, I think that the present law is quite sufficient.

2875. You mean that where the penalty is inflicted it is sufficient?—Yes.

2876. But that the law is not perhaps sufficiently definite?—Yes.

2877. Mr. Locke.] Are you well acquainted with the Lancashire and Cheshire mines?—I generally go amongst them, but I am not acquainted with their interior.

2878. What is your opinion of the qualification of the managers of the various collieries in Lancashire and Cheshire?—Very low, generally.

2879. Do you include Yorkshire?—Yes.

2880. Then you think that in Lancashire, Yorkshire, and Cheshire the qualification of the superintendents of mines is generally very low?—It is very low indeed, generally.

2881. Do you find a want of education among the superintendents, or do you allude to any moral defect?—There are both to a great extent.

2882. What kind of education have these men received?—A great many of them have had no education at all, except going to a school to learn to read and write, and cast a little, so that they can handle a pen nimbly and make a few figures, and work out a sum middling straight; but they have no really useful knowledge for mining purposes.

2883. Then those persons who have been so taught at school have no practical experience in mines before their appointment as managers?—Generally not; there are exceptions, but they are few and far between.

2884. Do those few cases of exception come up to your notion of the proper qualifications of a superintendent?—No.

2885. In your opinion, what qualification should an inspector or a superintendent of a mine possess?—I think that a manager of a mine ought to serve his apprenticeship, as they do in the North of England. I think that no man ought to be entrusted with the charge of a mine unless he has worked practically in a mine, and received a first-rate education, or served an apprenticeship to practical mining.

2886. Supposing that a man had been educated theoretically at a high-class school or college, and possessed all the theoretical information which could qualify him for accurately judging of any question relating to mining, would you admit him to the management of a mine, unless he had had some practical experience of a mine?—No.

2887. Then are you of opinion that theoretical education must always be coupled with a practical knowledge of the mode of working a mine, as well as of the principles of ventilation?—Yes.

2888. Is it your opinion that a man who has had a good thorough practical education, or rather experience in a mine, is sufficiently qualified, without having had a superior education, to manage a colliery?—No; I would sooner trust the practical man than the theoretical man; but I would rather have both.

2889. You have stated that you would prefer a workman who had some practical knowledge in the management of collieries?—Yes.

2890. Would you therefore make it imperative upon every person who was entrusted with a mine that he should have served an apprenticeship, or have obtained some practical knowledge in a proper and legitimate way of the working of a mine before he was entrusted with it?—The general notion is, that he ought either to have served seven years' apprenticeship, or to have held some inferior office, or worked in a mine in some way, at least 10 years.

2891. Are you now speaking of a person who is to take the charge of a mine?—Yes; the head manager.

2892. In some cases, where a man had been serving as an overman, or an underground steward, if he had long experience, do you think that he might be qualified to take a higher situation if he had been 10 years in the pit?—Yes.

2893. Then you are turning your attention to the qualifications for mining superintendence

superintendence by a practical man, rather than to high scholastic attainments? —Yes; but we would, as I say, rather have an educated manager and a practical manager as well. Supposing we must choose between the theoretical manager and the practical manager, we would select the practical manager.

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2894. *Chairman.*] If a man in the course of his experience has educated himself, would he meet your views entirely?—Those are the very best of men.

2895. With regard to your answer as to the overmen in your district not being the right sort of men, are there not overmen in your district who are as good as the overmen in any part of England?—Yes; I said there were exceptions.

2896. In your district are schools general?—They are not.

2897. Are there not schools attached to a proportion of the collieries in your district?—Some of the largest collieries have no schools. I am not aware that Messrs. Knowles, who employ something like 1,500 men, have any school at all of their own building.

2898. You have heard Mr. Jude state that, provided the men had some share in the appointment of the schoolmaster, and a control over the schools, they would have no objection to a rate being made compulsory by Act of Parliament, to which they should contribute a certain amount of their earnings towards the support of a school; do you agree with that statement?—I believe that some would object to it, but that the greater part would approve of it.

2899. In your opinion, would that be a beneficial enactment?—I believe it would; I highly approve of it.

2900. Do you think that educating the colliers would make them less reckless, and more observant of danger?—I do.

2901. Do you consider that educating them would not only increase their moral culture, but be a means of preventing accidents?—I believe it would have a great tendency to it.

2902. With regard to funds; are they pretty general in your district?—We have Odd Fellows' and Foresters' Societies; but not much else.

2903. Did you hear Mr. Henderson's statement with regard to a national fund being raised?—Yes; but I hardly comprehend what he meant; because it would be rather difficult to manage a national fund.

2904. He stated that he would not have contributions from the Government, but that he meant a fund to which the whole of the colliers should contribute a certain amount in the pound from their earnings, which should be exclusively devoted to accidents, and the support of widows and orphan children; do you think that such a plan is practicable?—I believe that the miners of Lancashire and Cheshire would object to it.

2905. On what principle?—They appear to have a great notion of self-control.

2906. Supposing a deputation were appointed to manage the funds, do you think their objection would be removed?—They have no notion of money going out of their own county.

2907. Provided the fund was confined to their own district, do you think they would agree to it?—I think they would. Every fortnight they have meetings, and each colliery sends a deputation; of course they do not always send the same deputation; and they would have a perfect control over it in that case, and perhaps they would not raise objections to it. I am not advocating it; and anything beyond that, I am perfectly satisfied they would object to.

2908. Is there anything else you wish to state?—I think that if it is necessary to use safety-lamps, blasting ought to be prohibited.

2909. Does your answer apply to the use of tobacco pipes, under the same circumstances?—Yes.

2910. *Mr. Cayley.*] Who do you think should appoint the special coroner?—The Government.

2911. *Chairman.*] Are the workmen anxious for the Report of the Committee of last year to be carried out?—Generally, with very slight exceptions.

2912. Do you think they are satisfied with the attention Parliament is paying to the subject?—They are very thankful to the Legislature for the attention they have paid to the subject; but they are frightened at the Committee's being appointed, apparently for the discussion of the jet and the furnace.

2913. And they hope they will not be sacrificed, in the contest between the  
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steam-jet and the furnace?—Aye; they do not want to be sacrificed between the steam-jet and the furnace.

2914. Mr. Cayley.] Have you any notion that Committees are sometimes appointed with a view to delay legislation?—I am not aware of it.

2915. Chairman.] Do you think that the working men have the slightest idea that this Committee has been appointed with a view of delaying legislation?—We have bits of notions about it; because they say, “We have had inquiry enough, and sufficient has been said, and we all know that mines can be ventilated; the jet is good, and the furnace is good, either of them will do; we do not care which it is, only let us have air; we do not see that there is any further need of inquiry, because while they are inquiring we are being sacrificed.”

2916. Mr. Locke.] You have stated that some change has taken place for the better?—Yes.

2917. Do not you think that a continued discussion would be rather useful in acting on the mining proprietors, to keep them a little up to the mark?—It was the Act of Parliament which made them attentive, and not the discussion.

2918. Do you think that Acts of Parliament would be passed, without preliminary discussion?—There has been discussion on this subject. In 1835 there was a Select Committee, and again in 1849, and again last year.

2919. Mr. H. Vivian.] Are you aware that the Act of Parliament arose out of the Committee of 1849?—Yes.

2920. That was a Committee of the House of Lords?—Yes.

2921. Chairman.] Are you aware how long the Committee sat last year?—No; I think about a month.

2922. Mr. Locke.] You ask for some amendment in the present law?—Yes.

2923. You mean that the amendment should take place after a proper inquiry had been instituted?—Yes, if there has not been sufficient inquiry; but we think there has been inquiry enough.

2924. Chairman.] You say that the Committee of last year sat a month; supposing that only five days' evidence were taken, do you think that was enough?—The Report was very good.

2925. Have you read the evidence?—I have read most of it; I cannot say that I have read it all. The Report is very good.

2926. Is it your opinion, that this inquiry will do good?—I think it will.

2927. Mr. Mostyn.] Are you aware that the last Committee only sat five days?—I am not.

2928. Chairman.] You have stated that great good has been done by inspectors in the ventilation of mines. Since the inspection, have you found a visible improvement in the health of the working miners?—Yes; and not only do I observe an improvement in the appearance of the men, but each man's name is registered in a registry-book, with his contribution each fortnight; so that by comparing the collieries, I can see that there is a visible improvement.

2929. And you attribute that to the attention which the present inspector has paid to the ventilation of mines in his district?—I believe it has arisen entirely from the inspector being appointed.

2930. And you believe that the present inspector generally gives satisfaction, both to the men and the masters?—Yes.

2931. Mr. Cayley.] The Committee of 1852 gave satisfaction to the working miners, although no working miners were examined?—Yes.

2932. Mr. Mostyn.] Are the instructions of Mr. Dickinson usually attended to in your district?—They are.

2933. You know of no instance to the contrary?—None; and whenever I see him, he asks me if I know of any mine which is dangerous; he is always anxious to get information of dangerous mines.

2934. Is attention paid to his instructions by the proprietors of mines?—Yes, generally; but there are some cases where, unfortunately, they have not been attended to.

2935. Mr. Cobbett.] You attribute the better appearance of the working people to the circumstance of Mr. Dickinson's recommendations having been attended to?—I cannot say that; I attribute it to the Act of Parliament being passed, because if the Act of Parliament had not passed, and the inspectors had not been appointed, they would never have improved their ventilation.

2936. Chairman.]

2936. *Chairman.*] Then, from the appointment of the inspectors, and the attention that the inspectors have paid, the ventilation has been improved?—Yes.

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*Mr. William Gray, called in; and Examined.*

2937. *Chairman.*] WHERE do you reside?—At Margam.

*Mr. W. Gray.*

2938. Have you been long acquainted with the working of collieries?—All my life.

2939. Have you been a workman in collieries?—Yes.

2940. Did you begin early in life to work in collieries?—Yes.

2941. At what age did you go into a colliery?—About 10 years of age.

2942. What was your occupation?—Keeping a door.

2943. Did you then become a cutter?—Yes.

2944. Were you long employed in hewing coal?—Not long; I should think not longer than two years.

2945. Were you advanced?—Yes.

2946. What did you become?—A deputy.

2947. Your duties then were the superintending and standing of timber?—Yes; and bratticing.

2948. How long were you engaged in that occupation?—Not very long; perhaps a year, or a year and a half.

2949. Did you then become an overman?—No; I then followed the occupation of sinking.

2950. Did you sink many shafts?—Yes.

2951. In what districts?—Chiefly in the Monkwearmouth district, and Unsworth.

2952. Had you anything to do with sinking the Monkwearmouth pits?—Yes.

2953. How long did you continue a sinker?—I should think that I was employed four or five years as a regular working man at sinking; the last four or five years of my servitude in sinking was as a master sinker.

2954. Did you continue to rise until you became an overman?—Yes; the last colliery was Unsworth colliery, where I had any connexion with sinking in the north of England; and I became overman of a colliery after the pits were sunk.

2955. Were you the overman who was engaged in opening the Unsworth colliery?—Yes; I sunk it, and opened it out.

2956. How long did you remain overman of Unsworth colliery?—About a year and a half.

2957. Where did you go?—I was engaged by Mr. Vivian, through the recommendation of Mr. Elliott, my former master.

2958. Have you been ever since with Mr. Vivian?—Yes.

2959. How long have you been with Mr. Vivian?—Nearly five years.

2960. Have you opened collieries since you have been with Mr. Vivian?—The colliery I came to was about 30 fathom standing when I came.

2961. Did you put a pit 30 fathoms down?—Yes; my first duty was to sink two pits down to the coal and working; and I have since had the chief management of that colliery.

2962. In point of fact, you have been all your life engaged in collieries?—Yes.

2963. Can you state the extent of working that you now superintend?—From one of the collieries that I manage there are about 100,000 tons raised annually.

2964. Can you describe the winnings of those pits?—Yes; they are sunk on a marsh, or a sea deposit; and no strata are met with, nothing but peat, and shells, and gravel, and stone, until we get down about 70 feet, and then we get the coal formations. We then generally sink until we find a place to form foundations for tubbing. Wales has a peculiar lime which stands water.

2965. Do you mean the lias limestone?—Yes.

2966. Are you much troubled with water in that district?—There is a very large quantity of water to contend with till after the tubbing is in.

2967. Have you directed your attention very much to ventilation?—Very much indeed.

2968. Have you directed your attention to any particular method of ventilation, q.76.

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tion, or to ventilation generally?—Not to any particular method of ventilation, but to ventilation generally.

2969. Have you ever used the steam-jet?—Yes.

2970. And also the furnace?—Yes.

2971. Have you ever made any experiments with regard to the steam-jet?—Yes.

2972. Under what circumstances have you used the steam-jet?—The nearest road we have got between our pits is 500 yards, and it is a very awkward thing to form a holing between two pits which are sunk a great distance from each other; and some easy mode of ventilation has to be contrived in some way, until a perfect one is got. In the first pit we sunk we put a brattice, and ventilated it on the high pressure system through the brattice.

2973. As a temporary remedy?—Yes.

2974. Did you find the steam-jet answer the purpose for which you adopted it?—Yes.

2975. Did you continue to use it after the pit was worn out?—No.

2976. Why did you abandon it?—I should not like to work it on a large scale.

2977. Why not?—I think it is a very slippery practice of ventilation.

2978. What do you mean by a “slippy practice”?—Easily slipped out of management altogether; it is not good to keep hold of.

2979. How?—So many things will go wrong about it.

2980. When you applied the steam-jet, had you the fires and the boilers which raised the steam at the bottom of the pit or the top?—The top.

2981. You took the pipes to the bottom?—No.

2982. How did you proceed?—I will read some of the experiments which I made. “The Morfa colliery was worked in 1849 with only one pit, divided by three-inch plank brattice into winding-shaft on one side and pumping-shaft on the other side. Winding-shaft was the down-cast of 50 feet area; pumping-shaft the up-cast of 25 feet area. Making an allowance for pumps, rods, beams, &c., the up-cast would not exceed 18 feet area. The ventilation was worked by high pressure steam, a culvert leading from the up-cast to a stack 60 feet high, with 16 feet area at the top, with the jet-pipes 8 feet from the bottom of the stack; 75 jets of  $\frac{1}{8}$  inch square, worked by two Cornish boilers, 30 feet long by 6 feet diameter, burning three tons of coal per 24 hours; steam worked up 50 lbs. per inch pressure; and, according to Biram’s anemometer, measured—

On December 19, 1849, 11,600 feet per minute.

On December 30, 1849, 13,104            ”

On February 17, 1850, 14,300            ”

Averaging about 13,000 feet per minute. This plan of applying the steam was abandoned. To apply the blast-pipes, a chamber was built 10 feet high, with sufficient area for 35 blast-pipes of 10 feet long, 5 inches diameter, the bottom part coned out to 10 inches diameter at the bottom, or receiving end, 35 jet tubes, 12 inches long, screwed perpendicular into the horizontal branch pipe, and each jet reaching 12 inches up the blast-pipes, and about 2 inches above the cone, or 2 inches into the parallel part of the blast-pipe; 18 of these jet-tubes were  $\frac{3}{16}$  inch area, and 17 tubes  $\frac{1}{8}$  inch area, worked from the same boilers, at 50 lbs. pressure per square inch, and burning three tons of coal per 24 hours, and measuring, according to Biram’s anemometer—

On the 20th June 1850, 19,000 feet per minute.

On the 1st July 1850, 18,000            ”

On the 14th Sept. 1850, 21,300            ”

Averaging about 19,000 feet per minute. This gave us an increase of 6,000 feet per minute over the jets merely going into the stack. The air was split into four divisions; average length of air-course 1,300 yards, of about 36 feet area each, which is about 4,077 feet of air per minute for one pound of coal consumed.

2983. Mr. H. Vivian.] Was the general result of the use of the blast-pipe system that you obtained an increased ventilation?—Yes; it increased on an average from 13,000 feet per minute to 19,000 feet per minute with the same boilers.

2984. Chairman.] Was that with the steam-jet alone, without any adjunct from



from rarefaction of any kind?—Yes, and at the top of the pit; and the jets were in the up-cast pit, covered down by three-inch plank doors.

2985. Mr. *H. Vivian*.] Was the utmost amount of ventilation you could obtain by the system you have described, from two Cornish boilers issuing into blast-pipes, similar to the blast-pipes of a locomotive engine at the top of the pit, 20,000 cubic feet per minute?—Yes; but, under better circumstances, we could have got more from the same boiler power.

2986. *Chairman*.] State the best circumstances, and the greatest power which you have obtained in your experiments?—We got a difference of from 13,000 to 19,000 cubic feet per minute.

2987. Are the Committee to understand that 19,000 cubic feet per minute is the greatest quantity you have obtained under the most beneficial circumstances?—We acted under very awkward circumstances.

2988. Acting under the best method that you have adopted, what is the greatest amount of ventilation you obtained?—I had not the power of adapting it to a better method, for the size of my pit confined me.

2989. You have stated, that with the means which were within your reach you raised the ventilation from 13,000 to 19,000 cubic feet per minute?—Yes.

2990. Mr. *H. Vivian*.] Have you since abandoned the steam-jet system of ventilation?—Yes.

2991. On what account?—Its being so liable to get out of order.

2992. When the two pits were connected, did you erect a furnace in the up-cast shaft?—Yes.

2993. What results did you obtain from that furnace?—We now get about 70,000 cubic feet of air per minute.

2994. By what consumption of coal?—Two tons and a half per 24 hours.

2995. *Chairman*.] That is a larger shaft than the one you have been speaking of?—Very much.

2996. Did you ever apply the steam-jet to the same shaft?—No.

2997. Then you have not made any comparison between the power of the furnace, and the power of the steam-jet in that shaft?—No.

2998. Mr. *H. Vivian*.] Was it a temporary arrangement?—Yes, until we got the other pit sunk.

2999. *Chairman*.] Is this a very fiery colliery?—Yes.

3000. Is it as fiery at the collieries in the north of England?—Yes.

3001. Is it necessary to pay great attention to the size of the air-ways?—Yes.

3002. Do you adopt the Newcastle mode of splitting the air?—Yes, to a great extent.

3003. How many men have you working in the colliery?—We have about 220 lights going; and I suppose 180 of them are men, and the others are boys.

3004. Do you make your splits with reference to the number of men in each department?—Yes; that must be attended to, to a certain extent.

3005. At the same time, in your opinion, is it not absolutely necessary that every man should breathe a certain portion of fresh air, which has not been impregnated by gas or by the breath of other men?—A pair of exploring drifts might be going into solid coal with only two men, and require more air to keep them safe than another district with 20 men.

3006. In your opinion, is it essential that each man should have a certain amount of air which has not been breathed by other men?—Yes, that is what we attend to.

3007. Do you conceive that any colliery can be judiciously carried on, however great may be the amount of ventilation, or whether the ventilation is raised by steam-jet or furnace, or whatever quantity of air may be taken down the shaft, unless particular care is paid to the distribution of the air, that each part of the colliery may have a sufficient quantity of fresh air?—That is one of the most important points.

3008. Have you paid great attention to that?—Yes; I have made it my chief study.

3009. You have stated, that in your colliery you have as much fire-damp to contend with as there is in the most fiery collieries in Northumberland; have you ever had an accident in your mine?—Yes.

3010. Of what nature?—We had an accident from fire-damp three years ago.

3011. How many men were burnt?—None were burnt to death at the time, but seven died afterwards.

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3012. What was the cause of the accident?—An explosion of fire-damp.
3013. Was it investigated by the inspector?—Yes.
3014. Did he make a report upon it?—Yes.
3015. What did he state to be the immediate cause of the explosion?—That it was not safe to work so explosive a mine with open lights; it was a new vein of coal, and we had no extent of working open.
3016. Mr. H. Vivian.] Did the accident happen very shortly after the mine was first opened?—Yes.
3017. Chairman.] In consequence of his report did you report to your employers his opinion, and did they act upon his opinion?—Yes.
3018. Since that time have lamps been used?—All the coal has been cut with safety-lamps ever since.
3019. Has any naked light been used at all?—Yes.
3020. Where?—We have appointed the district where the naked light goes up to, on the main road.
3021. Do the men invariably cut the coal and perform their work with safety-lamps?—Yes.
3022. Since the use of safety-lamps have you had any accident?—Not one.
3023. Have you had the inside of the lamps on fire?—Yes.
3024. What safety-lamps have you used?—The common Davy.
3025. Do the men ever complain of a want of light from the Davy lamp?—No.
3026. Do you think men are satisfied to work with the Davy lamp?—Quite so.
3027. Do you think they prefer it to a candle?—I do not think they like it better than a candle.
3028. Mr. Mostyn.] Do you prefer the Davy lamp to the Clanny lamp?—Yes, for the working men.
3029. Chairman.] Why?—I think the Clanny lamp is a dangerous lamp for any person except the officers.
3030. In consequence of the glass being liable to be broken by the water?—No; I have seen a glass split out of the side by its being badly annealed.
3031. Have you seen the lamp which has been invented by Dr. Glover?—Yes.
3032. What is your opinion of that lamp?—It is a double security to the other.
3033. Do you think that lamp would not give greater light, and afford as much security, as the Davy lamp?—I think there is quite enough light by the Davy lamp.
3034. Is it the practice in your pit, using (as you say you always do) the Davy lamp, to have one or two men to repair the lamps and to clean them, and fill them with oil?—Yes.
3035. You never allow the men to do that?—Never.
3036. Do you also have men under ground to keep the keys of these lamps?—Every deputy and overman has a key.
3037. Did you ever know an instance of a lamp being unlocked by a workman?—Yes.
3038. How did he manage to unlock the lamp?—We have had the keys taken out of the lamp-house.
3039. And you have had workmen working with the lamps unlocked?—Frequently.
3040. What do you do under those circumstances?—We fine the man as severely as we can.
3041. Do you ever get that reported to you by the other workmen?—Yes, it has been done.
3042. Do you think that workmen would at all times report to you if they found a man committing a dangerous act of that kind?—I think that generally they would.
3043. Have you ever endeavoured to obtain a summons against a man for opening his Davy lamp?—Yes; I have tried that.
3044. Did you fail?—Yes.
3045. On what ground did the magistrates refuse to grant you a summons?—They refused to grant a summons on the ground that the man had merely broken

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broken the rules of the colliery, and that in their court they had nothing to do with the rules of our colliery; that we might make such rules and levy such fines as we pleased; and that unless the man had done anything to injure a person, we could not bring him up.

3046. Do you think it would be desirable to make it an offence against the law for a workman to take off the top of his lamp?—I think it would be a very good thing, and it would be very easily understood.

3047. Mr. H. Vivian.] Would it produce a great moral effect?—It would.

3048. Mr. Fitzroy.] By your own bye-laws, do you fine a man for taking off the top of his lamp?—Yes.

3049. Have you any difficulty in enforcing the fine?—I have never had any difficulty.

3050. Has it produced the result of checking the practice?—Some men who are working in the colliery have been fined 21 s. twice, for smoking tobacco in the colliery.

3051. Has the infliction of a fine had the effect of checking the practice of uncovering the light?—To a certain extent, but it has not done away with it entirely.

3052. To what extent can you fine by the regulations of your colliery?—Twenty-one shillings is our highest fine.

3053. Mr. Cobbett.] Do you stop it out of the wages?—Yes.

3054. Mr. Fitzroy.] Why do you imagine that if the fine was inflicted by a magistrate it would have a greater effect than if it was inflicted in pursuance of the regulations of your colliery?—I think it would act more upon the mind of a working man if he was brought before a bench of magistrates, and he felt that his name would probably appear in the press in the next week.

3055. You think that circumstance would have a greater moral effect than the infliction of a pecuniary fine by the owner of the colliery?—I think a very great deal.

3056. Chairman.] You have stated that you now altogether work with safety-lamps; can you state to the Committee whether you pay men more for working with safety-lamps than you paid them when they worked with candles?—We pay the same price per ton as we paid before.

3057. Can you state the cost of the safety-lamps?—Yes.

3058. Do you find the oil for the men?—We find all the oil, and all the lamps.

3059. Did you find the men candles before?—No; they found their own lights before.

3060. And now you find them the oil with the safety-lamps?—They pay so much per day for the lamps and oil; but we supply them with light cheaper than they could supply themselves.

3061. Can you give the Committee any idea of the difference in the expense?—I find that I can maintain 220 safety-lamps for 220 l. per annum.

3062. Including repairs, wear and tear, and everything?—Yes.

3063. What do you allow for wear and tear?—I have made it out thus:—

	£.	s.	d.
"1,050 gallons of oil, at an average of 2s. 10 d. per gallon	148	5	—
60 new lamps, per annum, at 6 s. 3 d.	18	15	—
70 lbs. of fine cotton, at 1 s. 4 d. per lb.	4	13	4
Wire-gauze, wire for poles, solder, tools, &c.	10	—	—
Wages to oiling, trimming, and keeping the same in good repair, at 12 s. per week	81	4	—
Locking lamps under ground; 300 days at 6 d.	7	10	—
	£.	220	7 4

"Cost of each light, per day, 0.80 d."

3064. Have you compared that estimate with the cost of candles?—I have drawn out a comparative statement of the cost of burning candles daily.

3065. Mr. H. Vivian.] Have you contracted for a supply of candles?—Yes; I have been an overman, where I have supplied the colliery with candles.

o.76.

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3066. *Chairman.*] Therefore you are able to arrive at an accurate estimate of the cost?—Yes.

“ To maintain 220 lights per day: 180 workmen, averaging 10 hours per day, using six candles each, of 30 to the pound; 40 boys, averaging 12 hours per day, using seven candles each, of 30 to the pound, equal to 45½ per day, at 6 d. per pound; by allowing 300 working days per annum - - - - -	£. s. d.
“ Wages to one man for taking charge of these candles, and serving them out, at 12 s. per week - - - - -	340 - -
	31 4 -
	£. 371 4 -

“ Cost of each light per day - - - 1.34 d.”

3067. In point of fact, is it 50 per cent. cheaper to work with safety-lamps than with candles?—Yes. It is a halfpenny per day cheaper to work with safety-lamps. The one costs about 1½ d., and the other costs rather better than ¾ d.

3068. Have you read the Report of the Committee of 1852, with regard to safety-lamps?—Yes; I cannot bear the whole of it in mind.

3069. That Report states, that under particular circumstances the Davy lamp is not safe, and that the Committee do not recommend its use. In your experience, have you known any accident occur from the use of the Davy lamp?—Yes; I have known a lamp get damaged, and an explosion to take place.

3070. Suppose the lamps were kept in proper repair?—I never saw a perfect lamp explode.

3071. Do you think it would be proper to enforce by legislation the use of safety-lamps in fiery collieries?—Yes, I think it would be advisable.

3072. Mr. *H. Vivian.*] Would you lessen the ventilation because you used safety-lamps?—No.

3073. *Chairman.*] You would use the safety-lamp as an adjunct to ventilation?—Yes.

3074. How long have you been working with safety-lamps?—Three years.

3075. You have never had any explosion or accident since you used them?—No.

3076. Your workings have been carried on from day to day to a greater extent, and you have had more fire-damp to encounter, than you had when you were using the candles?—Very much.

3077. Do you ever find the lamp get red-hot?—No; we do not allow any person to work with his lamp on fire.

3078. Do you use brattices?—Yes.

3079. Do you pay particular attention to carrying the brattice up to the face of the shaft?—We could not work in a stall for a day without brattice, because the vein lies at an angle of 18 inches to the yard.

3080. Have you any printed regulations in your colliery?—Yes.

3081. Will you hand them in?—Yes.

[*The Witness delivered in the following Statement:*]

RULES and REGULATIONS to be observed by the Workmen employed at the Morfa Colliery.

More than six men are in no case to ride at one time, and the engineman is to lessen the speed of the engine to one half.

The firemen are to enter the colliery every morning at a sufficiently early hour to enable them to try each stall where a man is required to work, and having done so, to report to the overman the state of the colliery, before the arrival of the men. As an additional precaution, should they find any stall dangerous, they are required to fix a signal board, with the words “No person to enter this stall.”

The cutter is required to see either the overman or fireman before proceeding to his work. Should the cutter at any time consider that his stall is in a dangerous state, he is at once to leave it, and report the same to the overman.

The onsetter must send all the men and boys up the pit before he leaves the pit bottom.

The bankman must not leave the top of the pit, until the onsetter has come to bank.

No

No cutter or trammer is allowed to use a safety-lamp, without its first being examined by the lamp inspector, and then locked, and again re-examined by the overman or fireman.

Should any accident happen to a lamp while in use, by which the oil may be spilt upon the gauze, or by which it might in any other way be rendered unsafe, it is immediately to be taken out to the station fixed upon by the overman, and not again used until after having been properly examined by the overman or fireman.

Any cutter, trammer, or workman, on the appearance of fire-damp, is to retreat to a pure atmosphere.

All persons to whom the safety-lamp is entrusted are strictly prohibited from interfering in any way whatever with the lamp, beyond the necessary trimming of the wick with the picker; and the lamp is not to be placed within three feet of the side of the goaf, and not nearer the face of the coal than five feet.

Should any cutter, trammer, or other person, when in charge of a safety-lamp, lose his light, he is to take it to the station fixed upon by the overman, to be re-lighted; and when re-lighted it is to be examined and locked by the fireman before being again used.

It is particularly requested that any person witnessing improper treatment of the safety-lamp will give immediate information to the overman in charge of the pit, in order that proper steps may be taken to guard the lives of the workmen employed in the mine.

Smoking is not allowed in any part of the mine, and persons found so offending will be liable to a fine of 10 s., or be taken before a magistrate, and the fine to be paid to the informer.

No candle to be taken nearer to the pillar working than the station fixed upon by the overman; and any one found with a lighted candle within that distance will be fined 10 s.; the fine to be paid to the informer.

On no account is any person to keep a gun or dog of any kind.

No person is to have any description of gins, traps, or nets used for snaring game; and if found with any, he will be fined 15 s.

No one not connected with the colliery will be allowed to remain about it; and the timekeeper will be fined 2 s. 6 d. for each person so offending.

The workmen that are employed at the colliery are required to keep the direct road, and in nowise to trespass on the land by coming to, or going from their work; and if found so trespassing will be either discharged or fined.

3082. Do you prohibit smoking where safety-lamps are used?—Yes.

3083. Do you make any regulations with regard to the use of gunpowder?—Yes.

3084. Is the coal altogether hewn without gunpowder?—We use gunpowder.

3085. What are your regulations with regard to the use of gunpowder?—“To all that are working in the pits at the Morfa Colliery:—First, any person found smoking tobacco, or has in his possession pipes, tubes, cigars, or lucifer matches within these pits, will be fined one guinea. Second, all blast powder to be discharged by the overman or deputies. Third, any other person in the coal-working district of the colliery discharging blasting powder will be heavily fined.” That is printed in large letters, both English and Welsh, at the lamp cabin.

3086. Mr. H. Vivian.] Have you found it almost impossible to prevent smoking?—One man has been fined twice for smoking.

3087. Chairman.] Before you employ the men, do you read the rules to them?—Yes.

3088. Do you employ them on condition that they submit to those rules?—Yes.

3089. Have the rules ever been disputed by the men, and have you ever been taken before a magistrate for fining a man?—Never; but I have often been threatened to be taken before a magistrate.

3090. Do you find that the generality of the men cheerfully submit to the infliction of a fine if they break any rule?—Yes.

3091. Do you think that the safety of your mine is very much enhanced by these regulations?—Yes, very much indeed; I think that we should not be able to go on unless we observed the rules.

3092. Are there any regulations with regard to lowering the men down the pit?—We confine ourselves to a certain number in going down and coming up.

3093. Do you limit the engineman to a certain speed?—Yes; he has a printed board in the engine-house.

3094. What is the ordinary speed at which you wind the men up and down?—We draw up coals at the rate of about 80 fathoms in half a minute.

3095. At what speed do you wind the men up?—In about three quarters of a minute.

3096. In winding up that pit have you had many accidents?—Only one.

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3097. How much coal is raised from that pit?—About 100,000 tons per annum.

3098. In the course of four years you have had only one accident in the pit?—Yes; and this was caused by a person disobeying the order of the onsetter at the bottom; the carriage was lifting from the bottom; there were six men in it, and he leaped into it, and was caught at the first beam, and his neck was broken.

3099. Do you ever let men down when a full carriage of coals is coming up?—Yes.

3100. Your carriages are so made that none of the coal is above the top of the carriage?—There is a very strong plank cover fitted to the top rim of the carriage, a three-inch oak plank; so that no coal can possibly fall through and injure the men. If a piece of the ground in the shaft was to fall, it would not at all injure a man on the inside, because he has got a three-inch plank cover over his head, and there are three bolts through that cover; so that if the plank were broken the bolts would prevent the man from being injured.

3101. You have never, in any case, had any accident from substances falling on the men?—None.

3102. Mr. H. Vivian.] Have you known substances fall on the cage?—I have known a castiron tram-plate to fall from the top of the pit to the bottom, and only smash the cover in such a way that if a person had been inside the carriage he would not have been hurt.

3103. Chairman.] Is your pit walled from top to bottom?—The up-cast is walled.

3104. Do the men come up the up-cast?—No, the down-cast; it is all finished with tubbing to the feeder, and after that with inch and a half plank.

3105. All the way down?—Yes.

3106. So that it is impossible for material to fall out and injure the men?—Yes.

3107. Is it your opinion that the inspector should have the power, in your particular district, to see that the pits are properly walled or made safe, and that he should be allowed to enforce proper regulations for winding the men up and down the pits?—I would not object to his having the power of getting the pits walled; but I think that the manager of the colliery ought to know, as well as any other person, how to get the men up and down the pit.

3108. On looking at the returns, it appears that nearly 300 lives are every year sacrificed by accidents in winding men up and down the pits. In your colliery, where these regulations are in force, you say that during four years you have only had one accident. Is it your opinion that considerable accidents arise in consequence of carelessness?—Yes; in the three particular collieries that I have been connected with during the last 11 or 12 years, I cannot bring to my memory more than one man being killed.

3109. Is it not your opinion that these accidents arose from carelessness?—Yes.

3110. If an inspector had the power to see that care was taken, and that proper rules were adopted, do you think it would affect the owners of mines, who do take care of the safety of their workmen, as you seem to have done in the pits with which you are connected?—No.

3111. Do you see any objection to giving the inspectors the power to see that the pits are properly walled or made safe, and also to give them power to enforce proper regulation, so as to ensure the safety of the men?—No.

3112. In your own district, is it the custom for each collier to set his own props?—Yes.

3113. Have you ever tried Mr. Fourdrinier's cage?—Yes.

3114. Do you work it now?—No.

3115. Did you ever work it?—Yes.

3116. How long did you work it?—I should think for a year.

3117. What is the reason you abandoned it?—It is subject to get out of order, and is more dangerous than valuable; it catches in the pit.

3118. Supposing it did catch in the pit, what would be the consequence?—Half a ton of rope would go down on the cage, and perhaps force the guides out. Mr. Fourdrinier's apparatus has only power to hold on the guides; and if the guides are forced away, all goes together.

3119. Have

3119. Have you seen White and Grant's apparatus?—Yes; I have seen a model of it.

3120. Would the same observation apply to that apparatus?—Yes.

3121. Have you had an accident in your pit, in consequence of the Four-driner apparatus catching?—Yes; I have known a catch hang ten fathoms off the bottom, and the rope all come on it.

3122. Without damage?—Without damage; because there was not a sufficient weight of rope to carry the whole concern away. If it had been in mid-pit, where a large quantity of rope might have been on it, the consequence would have been, that it would have forced it away.

3123. In your district is it the custom for the men to set their own props?—It is very much the custom for the men to set their own props.

3124. Have you deputies in your pit?—Yes; we are obliged to have them in our colliery, which is rather an exception to the general rule in Wales.

3125. Do you approve of the principle of having deputies?—Yes.

3126. State your reasons?—The deputies in our pit have the charge of putting in all brattices and brattice posts, and firing all the blasting powder, and they have little districts allotted to them, of which they have the superintendence under the overmen. That is their daily occupation, and they remain in the district; and if anything goes wrong with any of the brattices they are there to put them in order, and they have the overman to apply to, which they can always do in a quarter of an hour or twenty minutes, finding him in another part, for assistance.

3127. Have you had accidents from falls of roof in your pit?—Only one man has been killed from a fall of coal.

3128. To what do you attribute so small a number of accidents?—I think it may be attributed to the strict attention which has been paid, to having the roof of the pit properly timbered, and inducing every officer to feel a responsibility resting upon him in the work which he has to perform.

3129. Is it your opinion that if greater care were taken, the number of accidents from those causes would be greatly diminished?—Yes.

3130. Has the inspector ever visited your pits since you have been there?—Yes, several times.

3131. In your opinion does the system of inspection work well?—I like it very well.

3132. Does the present inspector, Mr. Mackworth, give great satisfaction in the district?—Yes; I have never heard any person state the contrary.

3133. Is there a general disposition in the district, as far as you are acquainted with it, to follow reasonable suggestions of the inspector?—Yes.

3134. How often has Mr. Mackworth visited your pit?—I cannot say exactly; I think half a dozen times. He came twice on purpose to try the natural brattice.

3135. Do you believe that there is such a thing as a natural brattice?—No, not in a colliery.

3136. Do you think that if the air-ways were kept sufficiently large, it would be possible there might be such a thing as a natural brattice?—I think that if they were shut off altogether, it would not take place.

3137. Supposing the air-ways were sufficiently large to fill the up-cast shaft with air, could a natural brattice by any possibility exist?—It would not have any chance, if there was not a furnace.

3138. Mr. H. Vivian.] Have you taken the temperature of the shaft at various parts?—Yes.

3139. Have you any figures showing the temperature of the shaft?—I took the temperature of ours on Friday night.

3140. Will you state the temperature?—I found that we had 68,500 feet of air per minute through the colliery, which was rarefied from 62 degrees, before going on to the furnace, to 163 degrees, 20 feet from the top of the up-cast pit. Three-fourths of the air was carried over the furnace, and one-fourth taken into the up-cast by a separate drift, generally called the dumb drift. The temperature of the air at the top of the furnace arch, before entering the shaft, was 280 degrees. The temperature at the middle shaft, 40 fathoms, was 195 degrees. The temperature at the top of the up-cast shaft was 163 degrees. The temperature at the bottom of the down-cast shaft was 58 degrees.

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3141. *Chairman.*] Do you think it is possible that a natural brattice could exist if you had plenty of air-ways?—No.

3142. With regard to the furnace paradox, is it your opinion that heating the shaft and heating the furnace to an enormous extent would not increase the ventilation?—It is sure to increase it.

3143. Then the more rarefied you can make the air, in your opinion, there must be an increased ventilation, if sufficient attention were paid to air-ways?—Yes.

3144. Did you ever hear the men complain of having too much air in a Colliery?—Not in the stalls. The men would have, perhaps, some difficulty in turning out with a light in the main roads. That would not be an inconvenience; it would merely be a little annoyance to put them in the dark; but the men would not find fault at all with it.

3145. You do not think there is any fear from having too much air in a colliery?—No; I think it is the right side to get wrong upon, at all events.

3146. Have you ever worked your colliery by long work?—Not the Mofar Colliery.

3147. *Mr. H. Vivian.*] Practically speaking, do you find that gas invariably rises from those portions of the colliery which have been worked?—Yes.

3148. Consequently is it your practice to keep the air current sweeping along the upper face of the workings?—Yes.

3149. In doing so, have you ever found that any accumulation of gas takes place in the goaf or former working?—As long as the air-way is maintained and kept open at the high part of the goaf, I have never seen any accumulation of gas in the goaf.

3150. You are in the habit of making a deduction of 1½d. per week from each man for school, the same for the surgeon, and the same for the sick fund?—Yes.

3151. Have you ever found the men object to that deduction being made?—No.

3152. Have they always expressed themselves well contented with it?—Yes.

3153. *Chairman.*] Is there anything else you wish to state to the Committee?—No.

*Jovis, 7<sup>o</sup> die Julii, 1853.*

MEMBERS PRESENT.

Mr. Hutchins.  
Mr. Ingham.  
Mr. Baird.  
Mr. Cayley.  
Mr. Stephenson.

Mr. Mostyn.  
Mr. H. A. Bruce.  
Mr. Cobbett.  
Mr. Locke.

EDWARD J. HUTCHINS, Esq., IN THE CHAIR.

Mr. Allan Tellow, called in; and Examined.

Mr. A. Tellow.

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3154. *Chairman.*] WHERE do you reside?—At Hurst Carrs, near Ashton-under-Lyne.

3155. Have you been deputed by the Miners' Association to give evidence before this Committee?—Yes.

3156. What is your branch of the Miners' Association?—In Lancashire.

3157. What place?—The different towns and districts of the coal fields; namely, St. Helen's, Wigan, Bolton, and Oldham.

3158. Is it the same district which is represented by Mr. Swallow?—Yes.

3159. *Mr. Baird.*] Are you the secretary?—I am an agent employed by the Miners' Association; I have been about 12 months an agent.

3160. *Chairman.*]



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3160. *Chairman.*] What is your trade?—I have been brought up in mines for about 30 years; I commenced at 10 years of age.

3161. What has been your principal occupation?—Cutting coal. I have gone through all the various processes which are gone through by coalers in our district, from a waggoner to a pickman.

3162. Have you ceased working?—I have not been working in a pit for rather more than a year.

3163. Are you now exclusively employed as an agent for the Miners' Association, having no other occupation?—I carry on a little business as a shop-keeper.

3164. Are you acquainted with the feelings of the men in your district?—As far as 12 months' experience will give it me, I have a general view of the feelings and views of the country.

3165. Do the men complain that ventilation is deficient?—In some collieries. Small collieries, in our district, are worse than large collieries.

3166. Do they complain that sufficient attention is not paid to accidents?—Yes.

3167. What are their complaints in general?—Their general complaints are a want of more air, and that better attention should be paid to the air being circulated properly through the workings of the mine. The men not unfrequently complain of being wound up and let down too fast. In point of fact, I have seen myself accidents occur, through too many men being let down a mine; and when they had got to the bottom not having sufficient light to see their way out; they have sometimes been pulled up again with one leg out, and I have seen instances where men have been pulled to the top, and have not had an opportunity of getting out. That evil might be remedied, if it were insisted that the hooker-on should be at his post in the morning, and have a light to enable the men to see their way to get out; but when they are let down in great numbers, and have with them their picks and other things which they work with, and have not sufficient time given to them, these accidents occur.

3168. Do you attribute those accidents to improper men being employed to take care of the engine, or to what cause do you attribute them?—Not exactly to improper men being employed. The man had good abilities to manage the engine; but the men being ready in four different places to get in at the top, and having no light at the bottom to see their way out, they were not able to get out with the same advantage as they get in at the top.

3169. Does not the man who has the charge of the bottom of the pit go down before any of the men?—No.

3170. *Mr. Locke.*] Does the engine-man start his engine back again, unless he gets a signal from the bottom?—Yes.

3171. Then, in point of fact, the accidents of which you have now been giving an account, might be prevented, if the engine-man was not permitted to start the engine until he got a signal from the bottom of the shaft?—Yes.

3172. You have stated that you have known accidents arise from the speed at which men are drawn up and let down?—That has occurred when they have been let down so quickly; and it has had such an effect on their mind or body as to prevent their having proper recollection how to act under such circumstances.

3173. In those cases, do the men ride in a tub or on the rope?—In the district in which I live, four men and a lad generally come up in a box; but there are places in Lancashire where six or seven are allowed to go down, and as many as 14 or 15 in a gang; this increases the difficulty. I have frequently heard the men complain of that, and they think they ought not to be allowed, however good the machinery may be, to go down in such great numbers.

3174. Why do the men go down in those great numbers?—I suppose the reason simply is that there are so many to go down, and there is only a certain amount of time allowed to let them down. That is a rule established on the ground by the master.

3175. What rule does the master establish?—For so many men to go down.

3176. Is there such a rule at the collieries in Lancashire?—In the colliery in which I worked four were allowed to go down together.

3177. Do you consider that four is unsafe?—I consider four to be sufficient where they wind six cwt. of coals at once, and where the engine will pull a tub from the bottom, 250 yards, in a minute. We think that three men and a lad is sufficient.

Mr. A. Telford.

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3178. Do you know whether at collieries where seven or eight men are allowed to go down at one time, there is any rule by the proprietors, fixing the number to seven or eight?—I do not know that the proprietors have a printed rule that this shall be the case.

3179. Can you tell the Committee whether, in point of fact, it arises from any rule at all, or from the will of the men themselves?—I cannot state whether they have a printed rule as to the course that shall be pursued; but when proprietors or agents observe men taking unwise and rash steps of that description, they ought to interfere, and not allow them to go down in such great numbers, for fear an accident should happen.

3180. Do you think that the mischief arises from the proprietors not preventing the men putting themselves into dangerous positions?—In some cases. I do not know that there is any law or rule to compel men to go down on that principle.

3181. You only know that the fact is that the men do put themselves in that position?—Yes.

3182. *Chairman.*] Is there a rule that the man at the bottom of the pit shall go down before any of the men?—Not at any colliery that I am aware of.

3183. Is the proprietor of the pit aware that the men go down before the man who has the charge of the bottom of the pit, and that there is no one at the bottom of the pit with a light to direct the men?—They are perfectly aware of it, from the complaints of the men; and I know that at one place, where two or three accidents have happened, upon complaints being made to the master the evil has been remedied; and he does not allow the engineer to start the engine until there is a knock from the bottom.

3184. *Mr. Locke.*] What is the usual signal in the pit to the engineman to start the engine?—When the men are going down in the morning, under that regulation, they ring once; then supposing they begin to work, and send up coals, they ring once; and they understand when the engine begins to perform its daily labour.

3185. Then, in point of fact, the regulation is, that when men descend a pit, the engineman is not to start his engine until they ring once?—Not at that colliery now.

3186. Can you mention any colliery where that regulation is not in operation?—Yes; it is not in operation at some collieries.

3187. Can you mention any colliery where the engine is permitted, without having the bell rung once, or without having a signal from the bottom?—I can mention places; I have worked at the concern of Lees, Jones, and Booth for 20 years.

3188. Where is that?—In Lancashire.

3189. What part of Lancashire?—It is just bordering on Yorkshire; it is near Ashton-under-Lyne.

3190. Near Oldham?—Yes. They have concerns in both towns.

3191. Was that the practice in that colliery?—It was the practice there, but I never knew an accident occur at that colliery through a neglect of that description.

3192. Can you mention any other collieries where the engineman starts the engine without having a signal given to him?—It was the general practice throughout that part of Lancashire.

3193. Do you mean that it is the general practice that the engineman starts the engine without any signal?—Yes. When the men get into the tub at the top, and shout out "Go on," he does not know whether the men are out of the tub at the bottom or not.

3194. *Mr. Baird.*] Is that system still in operation?—I do not know any colliery but the one that I have mentioned, where the engineman is forbidden to go on until the bell is rung once at the bottom.

3195. That is the instance you have stated?—Yes.

3196. *Mr. Locke.*] Do you know whether there was such a regulation at the colliery of Lees, Jones and Booth?—I am not aware. The discipline was very strict at the colliery of Lees, Jones and Booth.

3197. You cannot state whether this was prohibited by their rules?—I do not know that they have any rule in the office that it shall not be the case.

3198. You cannot positively state whether they have or not?—I cannot.

3199. You

3199. You speak only of the practice?—Yes; and the custom.

3200. Do you think that, if any suggestion had been made by any of the workmen themselves to the owner of the colliery, about this dangerous practice, he would have had any objection to prohibiting the men starting from the bottom without a proper signal?—I do not think he would, if the difficulty to which the men were exposed had been properly explained to him. At this place, as soon as the matter was properly laid before the master, he at once gave orders that the engine should not start until the bell rang at the bottom.

3201. *Chairman.*] Have you never known the workmen incur danger, contrary to the express orders of the overlooker or the master?—Yes; I know one man who took his lamp-top off, contrary to the orders of the overlooker.

3202. Do you think that if there was a rule that not more than six, or any given number of men, should go down a pit, and the men were in a hurry, they would not break it if they thought they could do so with impunity?—I think that the engineer ought to have the power, when he sees a number of men getting into a tub, to prevent any more from descending.

3203. *Mr. Locke.*] How can the engineer prevent that which he cannot see?—To the best of my knowledge, there are no engines fixed which the engineer cannot see, at the top of the pit.

3204. Do the men ever descend in the dark?—Not unfrequently.

3205. How would the engineman be able to judge if it were in the dark?—If it were in the dark, and he could not see, he would not be able to ascertain the number.

3206. Then the engineman himself would not have the best means of preventing such an improper practice?—I do not think that the custom of not having lights at the top ought to be allowed in small collieries or large collieries. I think that all caution ought to be attended to.

3207. *Chairman.*] In your district are the pits properly walled, or do accidents occur from stone or other things falling on the heads of the men?—We have an improved system to what we had formerly; formerly we used to get our coals, and rob the pit's back, without building cross walls.

3208. *Mr. Cobbett.*] You have spoken of a rule as to the number of men going down in a tub; at what time do they go down in the morning?—At the colliery at which I last served for 10 years, the system which was pursued was the best system that I ever observed in Lancashire. We commenced descending the pit at six o'clock in the morning, and we were allowed, generally speaking, half-an-hour to let the men down.

3209. Was that done by a rule?—By a rule; the engineer had from six o'clock to half-past six to let the men down, and from half-past six to seven o'clock to arrange the machinery, and get all ready for pulling coals out.

3210. Then the men begin to go down the pit at six o'clock?—Yes.

3211. Do they assemble in any number at the mouth of the pit, and stand waiting to be let down?—Generally, they begin to come from five o'clock to six o'clock.

3212. At six o'clock are there a large number waiting to be let down?—Sometimes a score, and sometimes there may be thirty; it is according to the number of men who are employed in the pit.

3213. Is there always half an hour allowed for the purpose of letting the men down?—Yes.

3214. Have all the men who assemble at the pit to be let down in that half hour?—Yes.

3215. How many men would the tub in which they are let down, hold if it were filled?—The boxes will hold six cwt. of coal; and generally three men and a boy go down in a box.

3216. Is there any rule, either printed or given out by the manager, as to the number to be let down in every box?—If the ropes are in good order, they have no objection to four; if they happen to see a place giving way, they prohibit so many going down for a week or two.

3217. Do you mean to say, that if they saw that a rope was giving way, they would let anybody down?—Yes; I have seen instances where it has been worked for weeks, when they have seen that it has been giving way.

3218. Do not you consider that is an evil which ought to be remedied?—They generally consider that the banksman, the engineer, and the carpenter

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are able to judge whether the rope is going fast enough or not, or whether it is liable to break.

3219. You have stated that you have known instances in which 13 or 14 men went down in a box?—Yes; a man told me, about five or six weeks since, that 14 or 15 were allowed to descend at once.

3220. Did he tell you where that was allowed?—Yes; at Mr. Knowles' colliery.

3221. At what place?—I think he called it Yates Croft.

3222. Do you know where it is?—No; I do not exactly know the particular spot.

3223. Of your own knowledge, can you say that as many as 12 or 13 men have ever been let down in a box at one time?—I never saw it myself. I heard a man once state that he worked at a colliery, and that the only objection he had against working there was, that so many men went down together. I asked him how many went down together, and he said that he had seen as many as 19 or 20. I asked him how they got down into the boxes or skips; and he said they were one above another, and that when they got to the bottom they were liable to be lamed. I have never seen that number myself.

3224. Did you ever see more than four men go down together in a box?—Yes; I have seen five and six.

3225. Where?—I have seen five and six at the colliery where I worked.

3226. At Lees, Jones, and Booth's?—Yes; at both places.

3227. *Chairman.*] Do you conceive that there is any danger in five or six men going down a pit, if the engine goes at a fair rate?—Yes; and for this reason; pits are not always examined every fortnight, as I think they ought to be. There is a liability of the rods getting loose, and on that account allow the skip to have more play than it ought to have, and by that means getting what we call out of gear. If there are so many thrust up together in a tub, they have not that opportunity to arrange themselves which they ought to have. On that account I think it ought to be prohibited.

3228. You are speaking of pits where there are guides?—Yes.

3229. Are there any pits, in your district, which are worked without guides?—I am not aware of any at present; there have been some.

3230. *Mr. Stephenson.*] Do you think it is possible, if anything goes wrong when men are descending, to give a signal to the engineman, in order to avert the danger?—If the engine is not winding too quickly, there is a possibility of doing that. If it is going fast, there is not an opportunity of seeing the ropeswag.

3231. Did you ever give a signal of that kind while you were descending?—Scores of times.

3232. You have rung the bell when you were descending?—Yes; and in ascending also. I have known the gearing to be off, and the bell-line broken; and, if the engine had been going fast, the probability is that we should all have been thrown down the pit; but as the engine was going slowly, we had an opportunity of ringing the bell, and by that means of informing the engineman that something was wrong, and conduct themselves safely to the top.

3233. *Chairman.*] Do you think it is desirable that regulations should be enforced by the Legislature for the safety of men going down the pit, or would you rather leave it to the discretion of the masters themselves?—I think that there should be a law that such regulations should exist in small collieries and large ones.

3234. In order to establish those regulations, would you recommend that the coal owners should consult together with the men, in order to adopt certain regulations which might become general in the country, and which would be both advantageous, and generally adopted by all parties?—I should have no objection to the coal owners, the engineer, and the workmen consulting together. I think that the best plan of preserving men from being hurt should be adopted. I do not think there would be any objection, on the part of coal proprietors, to carrying out the best plan.

3235. You would not make any regulations which would interfere with the coal owners, more than you could possibly help, to prevent accidents and loss of life?—If I had the law to make, according to the knowledge that I have, I would not make a law which would in the least infringe upon the rights of any individual,

individual, further than that I would establish laws, rules, and regulations which would prevent, as far as possible, accidents and loss of life. That being done, I think it would be as much as is essentially useful; and I think that the men generally would be satisfied.

3236. From your knowledge of the men, do you think that a code of laws could be adopted which would satisfy the men, and also satisfy the coal proprietors and the head-viewers?—Perhaps we could not strike out a law which would satisfy all parties at present; but I think that if a law were established, we might gather such information from time to time as would both satisfy the employers and employed. I do not think at present we should be able to satisfy all parties. I think it wants a beginning.

3237. *Mr. Ingham.*] You think that as your information enlarged you might devise terms which would be agreeable to both parties?—Yes.

3238. *Chairman.*] Did you hear Mr. Swallow's evidence with regard to the inspectors?—Yes.

3239. Do you agree with him, that the men are satisfied with the present system of inspection?—I believe the men are generally satisfied with the present system of inspection, but they think it does not go far enough. The general view of the men of Cheshire and Lancashire is, that there ought to be more inspectors. There are six who are now regularly looking at the evils which arise in the coal field; but we think that number is not sufficient.

3240. You wish their number to be increased?—Yes.

3241. Do you wish the number to be increased by having more inspectors, or by having the same number of inspectors, and a certain number of sub-inspectors, as Mr. Swallow suggested?—I think the general view of the men, as well as my own opinion, is, that we ought to have sub-inspectors; that is, practical men who are acquainted with the workings of the coal field, and are able to discover where the evils exist, and point them out to parties who have the power of remedying them; and that if they are not remedied at the proper time, and after due notice has been given proper measures are not carried out, then of course there ought to be some other law to which they might appeal to get the thing done.

3242. Would you give the sub-inspectors the power to make any alterations themselves, without applying to the inspectors?—I would give the sub-inspectors no further power, than that they should be able travel the workings through, and to take the size of the air-ways; I think that men might be found who would be able to tell the speed of the air; and they should also have power to report to the head inspectors where evils existed which they thought ought to be remedied, but that in the first place they should report to the manager or master of the concern.

3243. Who is the inspector of your district?—Mr. Dickinson.

3244. Do you agree with Mr. Swallow, that Mr. Dickinson gives general satisfaction?—Mr. Dickinson, as far as I am aware (and I happened to work at a colliery which he visited), has given great satisfaction, and the men were generally well satisfied with the things that he pointed out. A great number of evils existed at the time Mr. Dickinson visited the work, and I feel great pleasure in saying that there was no objection, on the part of the employers, to carry out any measures which he thought might tend to improve the working of the concern; they were speedily attended to, and were carried out as soon as proper arrangements could be made.

3245. *Mr. Cobbett.*] Do you mean that Mr. Dickinson suggested things, which were carried out in accordance with his suggestions?—Yes; we had four or five different places which had been driven in, built up, standing full of sulphur; and he suggested that those places should be opened, and that the sulphur which was lodging there, and liable to be exploded, should be properly carried off, and the air properly circulated through those places. According to his suggestion, the master carried out the plan, and all the places which were full of sulphur previously to his visit were entirely cleared out, and were much more safe.

3246. *Mr. Cayley.*] Do you think the master did not know that before Mr. Dickinson told him?—I can hardly say whether the master knew all these particulars or not; I do not think that masters generally know when there are evils existing in a mine, and the men are exposed to danger.

3247. *Chairman.*] Did not the viewer know it?—The viewer knew it perfectly well.

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3248. He did not take proper care to effect the improvements before Mr. Dickinson visited the colliery?—They were built up previously to his coming; and, after his suggestion, they were opened, and the sulphur cleared out.

3249. Believing, as you do, that the workmen, the masters, and the viewers are perfectly satisfied with Mr. Dickinson, do you still think it would be better to employ sub-inspectors under him, than to increase the inspectors, and have the same class of men as Mr. Dickinson?—It would not do to have the same class of men to attend to the work as Mr. Dickinson, unless there were a sufficient number to traverse the workings through. If there were a sufficient number of the same class as Mr. Dickinson, who would be able to visit the extreme parts of the workings, where the evils arise, as well as just visiting the collieries, of course the men would have no objection to that. A great number of evils exist at the extreme parts of the workings, and, if they were not properly gone into, whatever might be the number of inspectors, those evils would not be lessened.

3250. Would you give the sub-inspectors more power than to report to the inspector?—I would give them no further power than just to point out the evils.

3251. You would give them power to point out the evils; and, if the evils were not remedied, they should report the circumstances to the inspector?—Yes.

3252. What power would you give the inspector?—If, after it had been made plain by a sub-inspector that an evil existed, it was not remedied, the inspector should visit and give timely notice; and if it was not attended to, after such notice as he should think in his judgment was sufficient, I would give him power to stop the concern until some other authority had been consulted.

3253. Mr. Swallow stated that the sub-inspectors should report to the inspector, and that the inspector should visit the mine; and that if the inspector had any doubt, he should call in another inspector and consult with him, and that if those two gentlemen agreed on a plan, they should have full power to carry it into effect. Would you give the power to one inspector, or do you think the inspector should call in another inspector, and that those two inspectors, if they agreed on consultation, should have the power of stopping a mine?—I would not give to one individual the power to stop a mine.

3254. Under what circumstances, and to whom would you give the power, to stop the mine?—I would have a Central Board in London, and that Board should have the power to consult with the inspectors in extreme cases; and they should at once have the power to carry out measures for accomplishing the end which they had in view, whatever it might be.

3255. You are of opinion that if the sub-inspector's suggestion was not carried out, he should report to the inspector, and that the inspector should again fairly recommend the coal owner to carry out whatever he thought was necessary; and if it was not done, you would merely give to the inspector the power to report to the Central Board in London, and give the Central Board in London full power to stop the mine, or of doing anything else they thought proper?—I think that, after proper methods of that description had been taken, the inspector should have power to stop the mine.

3256. Without reference to the Central Board?—I am taking into consideration that they would consult the Central Board.

3257. What duties would the Central Board perform, according to your view?—They would simply act according to the evidence which was presented before them, as to the evils which existed.

3258. If there was a difference of opinion, between a head viewer and one of the inspectors, the head viewer being an eminent man, you would give to the Central Board power to call the parties before them, and hear the case on both sides, and then judge for themselves?—When a point of that description arose, and there came a dispute between persons of the highest abilities, I think it ought to go to arbitration.

3259. What mode of arbitration would you suggest?—I am not able to answer that question.

3260. You have not considered the question?—No.

3261. It is merely a floating idea in your mind, that there ought to be a Central Board in London?—Yes; it is an idea in the minds of the people generally.

3262. Had they that idea before they read the Report of the Committee of 1852, or have they adopted that view since they received the evidence?—Previously to that report, the men had ideas and views on the subject; but from

Want

want of ability, they were not able to put them into anything like form. We lack greatly in that respect. From want of proper tuition or cultivation of the mind, and proper learning, we are not able to put our ideas into such a form as we like.

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3263. *Mr. Cobbett.*] What do the miners think of the Report of the Committee of 1852?—The miners were highly pleased at the conclusion to which the Committee came; and I fancied, in my own mind, that what would be most cheering to them was, that they pointed out that there ought to be a number of sub-inspectors; and we looked upon it in this light, that we should have more men looking at the evils which exist, and we should be able to point them out; and we were looking at that, as being the means by which our evils would be ultimately remedied.

3264. *Mr. Mostyn.*] By whom would you have the sub-inspectors appointed?—By the Government.

3265. *Mr. Cayley.*] Do you think that one use of the Central Board would be to appoint the inspectors and the sub-inspectors?—Yes; and that Board would have so much knowledge that it would be able to ascertain from a practical working man, whether his capabilities were such as would give a guarantee in employing him as a sub-inspector; and I think they would be able to inquire from him whether his practical knowledge was such as to guarantee them in appointing him.

3266. Do you think that another use of that Central Board would be, to see that all the inspectors and sub-inspectors acted on one uniform system?—Yes.

3267. *Chairman.*] Do you think it is possible to find a class of men for sub-inspectors who would give satisfaction to the workmen, the owners of mines, and the viewers?—Yes.

3268. Can you give the Committee an idea of the class of men you would appoint as sub-inspectors?—I think they should be working colliers. I would take them from the best practical men that we have in the coal field, and who properly understand, as far as practical knowledge is concerned, how a colliery ought to be carried on.

3269. Do not you think it is very difficult to find a working collier who has much knowledge of the mode of ventilating a colliery?—I think there are a great number of practical colliers, who have a better knowledge, than a great many under-lookers who are now employed.

3270. The duty of a working collier is, to go into his work and remain in his stall, and cut coal all day long?—That is the duty they wish to enjoin upon them; but we live in times when they take other things upon them.

3271. What other things do they take upon them?—They study how things ought to be conducted, and that is the reason they are able to point out the evils which exist.

3272. You think that, in point of fact, there are plenty of colliers to be found, who are capable of instructing the viewers in the best mode in which a colliery may be carried on?—A viewer you may, perhaps, take in a different light than we do. I think there are plenty of working colliers who have a better practical knowledge than some under-lookers.

3273. Take an under-looker. An under-looker is a man who is constantly in the colliery, and the viewer is a man who makes periodical visits. Is that the practice in Lancashire?—Yes. I would not say there are practical men who had as much knowledge as any under-looker; but, I say that some of them have more knowledge. Of course, if they did not improve and prepare themselves, they would never be able to become under-lookers.

3274. Is it your opinion that there are a sufficient number of working colliers to be found, in whom the masters or head viewers of collieries would have confidence to be appointed sub-inspectors, and come down into the place for the purpose of making suggestions as to ventilation and other parts of the workings?—Yes.

3275. *Mr. Ingham.*] What have the under-lookers generally been before they got their appointment?—All the under-lookers whom I know have generally gone through the regular process, from a drawer-up to a pickman.

3276. Does the under-looker come from the same body of clever miners from whom you would select the sub-inspectors?—Yes.

3277. *Chairman.*] Do you think it is necessary they should receive any education?—I would take them as they stand; I would commence the system as it



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is, with the best materials I have; and then at a future period this duty should be instilled into rising colliers and sub-inspectors, and on managers and under-lookers also.

3278. *Mr. Locke.*] Supposing that the Central Board in London entertained a different opinion to you, and thought that young men educated in some central establishment in London would make better under-lookers, what would the workmen think of appointments of that kind?—I think they would be dissatisfied. I think that the workmen have an opinion, that no one is so well qualified to answer their end, or so well able to point out the evils that exist, and get them remedied, as a man who has been practically trained to it from his youth.

3279. And therefore you think that any appointments of that kind which were made by the Central Board in London would not give satisfaction?—I think it would not give general satisfaction unless the sub-inspectors were taken from the class of workmen.

3280. How would you appoint the Central Board in London for the purpose of making it satisfactory to the general body of workmen?—If the Central Board in London should have power to examine the head inspectors and the sub-inspectors, they ought of course to have superior abilities to either of those two separate classes. In that respect, not being properly educated, I am hardly able to speak as to the class.

3281. Then, in point of fact, you speak of the Central Board as something upon which you have not made up your mind of whom it is to consist?—We look at it in this light, that if the Government appointed a Central Board, we have faith that they would appoint men who were qualified to look into the evils that exist, and to point out the remedies for those evils.

3282. Whether they should appoint such persons from the working miners to take the sub-inspectors' position, or whether they should appoint young men who had been educated in a central school in London, you cannot state?—No.

3283. But you hope they will appoint the working miners?—Yes, we hope so; and we think that unless that were done it would not give general satisfaction.

3284. The Board which is to appoint these persons ought, in your opinion, to have a practical knowledge of mining?—If it were driven into that kind of argument it would destroy the Board, because men who are brought up in a mine have not the opportunity of getting those abilities which would be required.

3285. Do you think it would be an advantage that the persons composing the Central Board should have any practical knowledge of mining?—It might be an advantage.

3286. Do you think they would be competent to appoint or to examine proper persons without having a practical knowledge of mining?—I hardly think they would.

3287. *Mr. Cayley.*] Do you think that if the Government were to determine to put an end to the evils which now exist in mines, they would have, for any long time together, any difficulty in finding men equal to the duty?—No; I believe that if the Government came to such a conclusion, they have already obtained such an amount of information that they might come at such as would be able to remedy all the evils which the colliers generally complain of.

3288. Supposing there were some difficulty at first in finding proper men to fill the office of sub-inspectors, did you ever know, in your experience, of a demand for an article in this country, without a supply very soon growing up, which was equal to the demand?—No.

3289. *Chairman.*] In order to get good men, would it be necessary to pay them well?—Yes, they ought to be paid well, in order that they might be out of the reach of what we call temptation, or inducement to do things which they ought not to do.

3290. *Mr. Cayley.*] Do you believe that all that is wanted for the purpose of securing an improvement in the present state of the mines, for the safety of the working men, is a thorough determination on the part of the Government to secure that object?—Yes. I believe that now, if the Government said, on behalf of the mining population generally, "We will commence with the means we have, and we will remedy the evil as far as we can," they would be able to do it, and they would be able to obtain information which would point out evils of which at present they are not aware.

3291. *Mr. Cobbett.*] Supposing the Government appointed a set of sub-inspectors,



inspectors, equal in capacity to the present inspectors, would not those sub-inspectors satisfy the miners?—They might satisfy the miners, but I do not think they would. As far as I am individually concerned, I would have men who had been properly trained from their childhood to be familiar with the evils of which colliers generally complain.

3292. *Chairman.*] You would rather prefer that they should be practical men, than men having scientific knowledge?—If I could not meet with men who had scientific knowledge, and practical knowledge also, I would commence with the thing as it is. If I could meet with men who had a scientific knowledge, and also a practical acquaintance with mining, those are the parties to whom I should give the preference.

3293. In your opinion, has the present system of inspection been beneficial, as far as it has gone?—I think it has.

3294. Do you think that the ventilation is better now than it was before the inspectors were appointed?—Yes.

3295. Do you consider that that improvement is to be attributed to the inspection?—Yes. I am perfectly aware of one concern, where no less than 15 lives were lost in less than two years, with the ability to have ventilated the mine; and that, under their suggestion, the evil has been remedied, and they are not exposed to anything like it now.

3296. Do the men wish this Committee to recommend any particular system of ventilation?—No. We are perfectly satisfied that there are means at hand, which are capable of answering all the ends we want in that respect.

3297. What they want is, a sufficient supply of fresh air to preserve their health, and to keep the mines free from explosion?—Yes; and the air to be properly circulated.

3298. Would it be possible to keep a mine free from explosion, however much air was carried into the pit, unless it was properly circulated through that pit?—No.

3299. Is it the custom in your district to split the air?—I do not see how a mine can be ventilated without splitting the air.

3300. Is the system of splitting the air generally adopted in your district?—Yes.

3301. Is it more adopted now, than it was before the appointment of the inspectors?—I cannot speak to that.

3302. In your district, is sufficient care taken to keep the airways in proper order and to keep them of sufficient size?—At some places; and at others it is not so. Some places are very well ventilated; I have worked 20 years at one concern; they have a very extensive coal field, and they have never had what we call a serious explosion.

3303. Is that a very fiery seam?—Yes; it is what we call the Black Mine, and it is four feet thick.

3304. Did you ever hear the colliers complain of having too much air?—No; I do not remember hearing anything of that description, in its proper circulation. I may have heard a man, when he has been close to the shaft where all the power of ventilation has been on, say that it was very cold; but when it has been properly distributed, I do not recollect an instance.

3305. Do the workmen agree with the Report of the Committee of 1852?—Generally speaking, I think they do.

3306. You do not mean to state that they agree to every paragraph of the report?—No; I think what they rested on most is, that the Committee suggested that a sufficient number of sub-inspectors should be appointed, and that they would be able to point out the evils which exist.

3307. Do the colliers object to the use of the safety lamp?—Not generally.

3308. Do you agree with the Report of the Committee of 1852, with respect to the safety lamp?—I have never read the opinion of the Committee on that point.

3309. Is it your opinion, that the use of the safety-lamp in very fiery mines ought to be made compulsory?—Yes.

3310. You do not say that with a view of making the ventilation worse?—Not in the least.

3311. You think that the first care should be, to see that as much ventilation was brought into the mine as possible; but that, as an extra safeguard in fiery mines, the safety-lamp should be used also?—Yes.

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3312. Would you confine the use of the safety lamp to the neighbourhood of the goaves, or to any particular district of the mine?—I think that, as far as possible, there ought to be attention paid to clearing the goaves of the foul air.

3313. Do you think it is possible to clear a very large goaf?—We have a firm, who are working out on one side of the pit close to 2,000 yards, and about 600 yards on the other side; and the system they adopt is, to build what we call cross walls; they put a three-yard wall in every eight yards. They keep as much as possible their top air road safe and clear, and up these wall ends they have now a system of what they call rambling the air; that is, after they have taken the air through all the various splittings, to circulate it, through each mine; they have a system which they call turning it out and allowing it to go up these different stalls or wall ends, and find its way out at the top airways; and that is a good system of clearing the goaves. We can sometimes go as far as 200 yards back; and then the surface coming down gently, and the floor heaving up, these goaves come together without those serious falls, and driving the sulphur back on the workmen. When they are going to leave off 100 yards at the further end, they so make their preparations as to have a fresh preparation made to carry the air into the back air road. These are means of preventing accidents by driving the sulphur on the top of the men, and that is a good system.

3314. Where is that system adopted?—Lees, Jones, & Booth carry on that system extensively; they have another plan, which has been worked advantageously both for the men and for themselves. When they are opening a new coal field, they will, as soon as possible, get a road round the boundary of the coal field; it drains the sulphur out of the body of coal which has to be worked. They can work the body of coal at rather less expense, and with more safety to the men.

3315. In that case, would it be necessary to open out the pit a long time before you wanted to raise any coal?—Formerly, when we were getting what we call the crop coal, we had not the same evil to contend with; we are now getting more on the dip, 600 or 700 yards down; so that these preparations are made regularly as they go on, and perhaps commence a twelvemonth previously to its being required to be worked out.

3316. Have you considered the question of refuge stalls?—That is a subject to which I have not paid attention.

3317. Do you prefer ventilating the goaf to stopping up the goaf?—From my practical observation of stopping up the goaves or walling them off, the men are of opinion that it is an impossibility to wall the sulphur off; it will break out. We would rather have the goaves cleared, if it is possible to do it.

3318. If it were not possible to clear the goaves, in your opinion could the goaves be closely walled up, so that as little gas as possible should escape?—Yes.

3319. Do you think that a good current of air should at all times pass round the goaves, whether they were stopped up closely or not?—Yes, close up to the face of the goaves.

3320. With regard to accidents from falls of roof, Mr. Swallow stated that two modes were adopted in your district; namely, having a deputy to stand the timber, or the men standing the timber themselves. In your opinion, which plan is most safe?—Being a practical man myself, I should prefer setting my own timber. I think there is less danger, when a man comes to draw what we call a set of posts. After he has cleared it out, he is the best judge on which post lies the greatest weight; and it is not always the case that a master wishes you to draw that post. When you know on which post the greatest weight lies, you may sometimes get half a dozen round that post, while, if you took that post it would bring all in together.

3321. Then you do not agree with the evidence of some of the Northumberland people, who stated to this Committee that the deputies, being constantly employed in sounding the roof and in standing timber, would be much more likely to put the timber in a safe position, than if the collier was obliged to stand his own timber?—If in Lancashire it was the rule that we had to wait until a deputy came, we should not unfrequently be blamed; so that I think it is the duty of every workman to set his own posts.

3322. Throughout your district in general, is sufficient timber given to the men for the purpose of standing?—Generally speaking, they have to go through the proper process, but there is generally timber at their command.

3323. Have

3323. Have you heard any complaints in that respect from the men?—No.

3324. With regard to verdicts, do you agree with the evidence of Mr. Swallow, that the present system of coroners' juries is not satisfactory?—I think that, generally speaking, juries are composed of men who do not understand the system of the coal field; and that being the case, they are not able to glean that amount of information which they ought to possess on those subjects. We should like the system to be altered, if it were possible to alter it advantageously.

3325. Mr. Ingham.] You would wish to have a body who were more competent to examine into the origin of accidents?—Yes; I think that at least some of the jury ought to understand the nature of a coal pit, that they might be able to get information of parties who gave evidence of the circumstances which transpired.

3326. Mr. Cayley.] Have you ever known a case where a verdict has been given, as you considered, contrary to the evidence?—I have known cases in which the public have complained of the evidence which had been brought forward, and thought that the parties who were concerned ought to have been punished one way or another.

3327. Have you ever known deaths to take place, where the evidence seemed to implicate the mode in which the parties had been destroyed, and the verdict of the jury given contrary to the evidence?—I do not know it from my own observation; I have heard complaints of that description; I heard a person state that he was once on an inquest of that sort, and had to give opposite evidence, as Mr. Swallow stated the other day.

3328. Mr. Locke.] Have you often heard, in other cases as well as mine accidents, that the verdicts of juries have not been consistent with the evidence?—I have heard such complaints made.

3329. Mr. Baird.] Did you ever attend a coroner's inquest?—Never.

3330. Chairman.] Is there any other point, connected with this inquiry, upon which you wish to give evidence?—I think, if the Legislature do legislate upon this subject, there ought to be a law that all collieries should have a system of ventilation, either by the furnace or the steam-jet.

3331. That is, that a colliery ought not, under any circumstances, to be carried on by natural ventilation?—No; I think that a great deal of evil exists in small collieries, from black-damp and such things, which are never noticed, and which are detrimental to health.

3332. Mr. Ingham.] You state that, in almost all collieries, you think there could be discovered some able practical miners who would be competent to fill the situation of sub-inspectors?—I think they might be found in the country; I do not say they would be found in every colliery.

3333. In every coal field?—I should think so.

3334. From your knowledge of this class of men, do you find a disposition on their part to avail themselves of opportunities of getting information from books?—On the part of several there is such a disposition; but it is not so general as I should like to see it.

3335. Do you think that the best practical miners have a desire of improving themselves by reading and learning?—Yes; I think that if schools were established, in which miners' children received an education for so many years, similar to that which is received by factory children, we should in a few years have a superior class of miners than we have at present.

3336. You said that it was very likely that, at first starting, the men who would be chosen as sub-inspectors might not have so much information as you would wish. If local mining schools were established, do you think this class of men would be willing to give some of their spare time, if they have any spare time, to improve themselves by study and learning?—Yes; I think every well-disposed man would avail himself of every opportunity which was calculated to elevate him in society.

3337. Do you think that is the disposition of these men?—I think there are colliers who are disposed to do so.

3338. If they had some accessible mining schools, do not you think, although they might not at first be adequate in every respect, yet that after practice for a year or two they would be competent as sub-inspectors, both from their scientific knowledge as well as their practical knowledge?—Perfectly.

3339. Would it be very desirable to establish, in the neighbourhood of all

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great coal fields, some kind of mining schools, where men, if they were so disposed, might obtain the requisite scientific information?—Yes; and I think also, that as far as the Government has control, or as far as the Board in London has control over the present class of schoolmasters which exist in the district of cotton manufactories, if their attention was turned to training young men up to the study of these things, and showing them the importance of them, at a future time we should see fruits springing up which we never expected.

3340. Mr. Cayley.] From what you have stated with regard to ventilation, are the Committee to understand that, although no explosion may have taken place, yet that the state of the ventilation is very insufficient?—Yes.

3341. And that although the destruction to life may not be so immediate from fire-damp, yet that, from the existence of black-damp, the health of the miners is so prejudiced, it is equally sure in the end?—Yes. I have seen instances of that description. I have seen what we call a waggoner, who for three or four days together never could have a light, except at certain places. When we have been getting coal in certain places, we have had to stick our candle a few yards off. Scores of times I have put my hand, as if I thought it would have prohibited our light going out. Since then, I have thought about the subject, and I was absorbing the air which kept the candle alive, although it was useless to do so; but being out of breath, and having little air to breathe, these are the difficulties; and the sufferings of the men in this respect are almost incredible.

3342. How did the candle burn under those circumstances?—We had to burn three candles generally, where we ought to have burned only one. Then there is an additional difficulty with the partly-burnt tallow; and there is the smell of the wick, which hangs down sometimes three inches long, not all burnt. This arises from the want of proper ventilation.

3343. Why did you hold the candle downwards instead of upwards?—Simply that if it is held straight upwards, the air is so light that the blaze would go off. If we held it horizontally, it gets partly fed, and it keeps a clearer blaze; so that it keeps the candle burning on that principle, which it would not do if it were held straight up.

3344. You mean to say that the amount of fresh air was so small, that the candle would not burn in an upright position?—Yes; I have seen that hundreds of times.

3345. Do you think the working men would be satisfied with less wages if the ventilation was better?—I think that if the ventilation was better a concern would be worked for less money; but all these difficulties make the collier's wages less. He has these difficulties to encounter for the same amount of money as he would receive for work in pure air.

3346. Chairman.] Do they generally cut coal by the ton?—Yes.

3347. Therefore, if the ventilation was better they would cut more coal in a day, and possibly for a less price per ton, which would be cheaper to the coal-owner?—Yes.

3348. Mr. Cayley.] Has it come within your experience that the miners have said they would be willing to work for less wages if the atmosphere was more healthy to work in?—To the best of my knowledge I have never heard them say so with reference to black-damp; but, with reference to fire-damp, I have frequently heard the colliers state that they would rather work for three-pence a day less, where there was no sulphur, than they would where there was sulphur.

3349. Chairman.] Is there anything else you wish to state?—I should like to see the day come when the Government stated that there should be a law passed that miners' children should have a proper and good education.

3350. Would you make it incumbent on the miner to contribute so much in the pound of his earnings towards educating his own children?—I think they would need no compulsion; I think they would feel disposed to pay the same amount towards the school that the factory people pay.

3351. Mr. Locke.] Can you state why they do not do that now?—I think that all families who have the opportunity of sending their children to school are willing to do it now, but the law is different. I could take my child into a coal field at 10 years of age, and I could work it any number of hours I thought proper; but if I wanted to take my child to a factory at 10 years of age, the law says that he must only go six hours the day.

3352. Chairman.] Do you think that a law preventing a man from sending his

his child into a coal-pit before he was 14 years of age would be generally satisfactory to the workmen?—Yes.

3353. *Mr. Locke.*] Do you think that, if that were done, the workmen themselves would take up the question of education, and properly educate their own children?—I think that there would be no general objection to paying the same amount per week that the factory folks pay for their children.

3354. They would not ask the Government to contribute anything towards the support of their school?—I think they might be disposed to say, that the same privilege which is granted to schools for the education of factory children ought to be granted to them.

3355. And no more?—I do not think they would ask for more.

3356. *Mr. Cayley.*] At what age do they enter a mine now?—Ten years.

3357. Is there a general opinion that fourteen years should be the age?—I do not think it has been taken up generally amongst the miners to ascertain the general opinion. I have heard individuals state, that fourteen years of age is quite soon enough for a child to go into a pit.

3358. *Chairman.*] Take the case of a man having a very large young family, the eldest of whom is ten years of age, and the whole of the children entirely dependent upon him for support; do not you think he would complain, if by law he was obliged to maintain his child without putting him to work until he was fourteen years of age?—I think that if you were to say twelve years of age it would perhaps give more general satisfaction. There would be instances in which men would complain; for instance, if a person wished to get from his children all he could in their infancy, he might use it, and give them no education at all.

3359. Your opinion is, that the right-thinking body of the working people would be satisfied with such a law as you have now stated, limiting the age to twelve years?—Yes; I think there would be no general objection to it.

3360. Is there anything further you wish to state?—No.

*Nicholas Wood, Esq., called in; and Examined.*

3361. *Chairman.*] ARE you still as extensively engaged as a coal viewer and manager as you were when you gave your evidence before the Committee of 1852?—Yes.

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3362. The last question put to you by that Committee was this: "You are now very busy on the subject of these experiments with regard to the jet; when it is ready for examination, it is your intention, I understand you to say, to invite Mr. Forster and Mr. Gurney to see it, and you will have it fairly tested." Have you had the steam-jet fairly tested?—I have. Soon after the termination of the Committee in 1852, I made preparations to have it tested with the utmost fairness.

3363. Did you invite Mr. Forster and Mr. Gurney to witness those experiments?—We have a mining institute in Newcastle, of which I am president; and the secretary of the institute was desired to write to Mr. Gurney officially, to ask him to be present at the experiments; and he also wrote to Mr. Forster. I had myself seen Mr. Forster several times, and invited him to be present at the experiments.

3364. Were they present?—No. Mr. Gurney wrote to the secretary, to state that it was inconvenient to him to come down to witness the experiments; and Mr. Forster, when the day came, stated that he was not able to attend.

3365. Will you give the Committee, in detail, some of the experiments which you made?—The three principal collieries at which I tried the experiments, were Hetton, Killingworth, and Tyne Main. The Hetton Colliery is 900 feet in depth, and the jets were placed at the bottom of the pit; the boilers, and consequently the fires of the boilers, being also at the bottom of the pit, the heat of the fires from the boilers passed into the upcast shaft, and added to the ventilating power of the shaft, as well as to the mechanical power of the jets. The upcast is 153 feet in area; and there are two downcasts which are respectively 98 feet and 58 feet area, together 156 feet. The ventilating power at the Hetton Colliery generally is by three furnaces, one being nine feet in width, and the other two eight feet each. Figures 3 and 4, Plate I., is a section of the Hetton shaft showing the application of the three furnaces, B, B, and C, and of the boilers A, A, from which the steam was obtained to supply the steam-jets. The

*Vide Experiments, on Furnace and Steam Jet Ventilation, Appendix to Third Report.*

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pipe leading to the steam-jets, is shown at D, Figure 8, in the same plate; shows the disposition of the jets placed in the shaft at G. Figures 6 and 7 show elevations of the furnaces. The diameter of the steam-pipe D, was six inches; and in the experiments three sets of jets were used at different times, being respectively,  $\frac{1}{16}$ ths,  $\frac{1}{8}$ ths, and  $\frac{3}{16}$ ths of an inch in diameter, for the purpose of showing which size was the most effective.

3366. At all times were there the same number of jets, but of different diameters?—Yes; the number being 37 in each case.

3367. What is the extent of the workings of the Hetton Colliery?—The workings of the Hetton Colliery are spread over an extent of upwards of 2,000 acres, comprising coal partly worked, and coal standing in pillars and goaves.

3368. How many shafts are there in that colliery?—Five.

3369. How many upcasts?—Two upcasts and three downcasts; but at that part of the colliery which was the subject of the experiments, there were only two downcasts and one upcast, and, as I before stated, the two downcasts comprised 156 feet in area, and the one upcast comprised 153 feet in area.

3370. *Mr. Locke.*] Was there any connection between the other parts of the mine at the time of that experiment?—No; except a small portion of air, which was brought from the other colliery to the upcast, which is mentioned in the experiments. Table No. I, in the Appendix to the Experiments, shows the extent of the ventilation. The total quantity of air sent down the downcast shafts, amounted to 210,000 cubic feet per minute. And the synopsis shows the distribution of that air round the workings of the mine, and the length of run of each current of air. It will be found, on summing it up, that the total distance which the different currents of air travel, is 97 miles 1 furlong, and 100 yards. At some period of traversing the workings that is split into 38 divisions.

3371. The 210,000 cubic feet per minute refers to the whole colliery?—Only to the colliery which was the subject of the experiments.

3372. *Mr. Stephenson.*] That quantity went down the two downcasts, and came up the upcast?—Yes; I have set aside that part of the colliery which comprises the other two downcasts and one upcast. I will go on with that division of the colliery which comprises two downcasts and one upcast, the extent of run of air that I have stated, and the subject of the experiments.

3373. *Mr. Locke.*] Have you taken that extent into your computation?—I have, in all the experiments with the jet and the furnace; they were subjected to a drag of air equal in the aggregate to 97 miles, and sub-divided as shown in the synopsis. I found it necessary, in carrying out the experiments, to divide the power of ventilation under the different heads of,—natural ventilation;—engine fires alone;—engine fires and steam;—and then of engine fires, steam, and jets. Then the furnaces;—the furnace engine fires and steam;—and the furnace, engine fires, steam and jets. I found it necessary that that should be done, in consequence of the evidence which was given in 1852, attributing to the jets that which did not belong to the jets as a mechanical force, but that part also of the ventilation which was attributable to the heat of the engine fires, and to the heat of the steam when the jets were placed at the bottom of the shaft. The natural ventilation, and the boiler fires, and the steam, independently of the mechanical force of the jets, produces a certain amount of ventilation, and then we have the mechanical force of the jets. I found that unless they were so divided, I could not arrive at a correct measure of the force of the jets.

3374. *Chairman.*] You had no opportunity of trying the jets without the aid of artificial heat?—Not when the jets were placed at the bottom of the pit; but I will give afterwards, at Tyne Main, experiments with the jets placed at the top of the pit, acting without the artificial aid of the boiler fires and the steam. There being a difference of opinion also as to the effect of the jets placed at the bottom and at the top of the pit, it was necessary to go into them in both modes.

Table I. shows the experiments made at the Hetton Colliery, on the 12th October and the 3d November; Table II. shows the experiments made on the 29th October, 30th October, and 31st October; Table III. shows the experiments made on the 13th November; Table IV. shows experiments made on December 11th; Table V. shows experiments which were made on 3d January 1853; Table VI. shows experiments which were made on 8th January 1853. I will take one of those experiments, as an example of the whole, to illustrate the mode in which they were done. I will take the experiments which were made on 29th, 30th, and 31st October, which are contained in Table II. On looking at that table,

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table, it will be seen that the first experiment was made with the three furnaces and the boiler fires, the steam blowing into the shaft, just as it had been when the pit was working; so that in that experiment we had, the natural ventilation, the boiler fires, and the steam; and it will be seen that that gave a ventilation at 6h. 30m. P.M. of 205,615 cubic feet per minute; and at 7h. 30m. P.M. it gave a ventilation of 201,274 cubic feet per minute. When these were in operation, viz., the boiler fires, the furnaces, and the steam, we applied the jets; so that the next experiment was, the jets in addition to the boiler fires, the three furnaces and the steam; and in that application it would be an auxiliary to the furnace system, the steam being at 40 lbs. to the square inch. The next experiment therefore was, the mechanical force of the jet over the three furnaces, the engine fires, and the steam, and the result was 205,636 cubic feet per minute, making for the mechanical force of the steam-jets 4,362 cubic feet of air per minute. The experiment then ceased, so far as regarded the test of the power of the jets; and the furnaces were put out, the engine fires were damped, and they remained out until 6. 30 A.M. the next morning; that is, from 40 minutes past 10 P.M. on the 29th until 6. 30 A.M. on the 30th, there were no furnaces and no artificial ventilation at all. The temperature of the shaft cooled down from 170° or 173° to 88° or 85° at ten fathoms down, and midway from 180° to 85°. We then had nothing but the natural ventilation, or the heat of the shaft alone, without any extraneous power. This must not however be considered to be the natural temperature of the mine; the shaft was not quite cooled down to the temperature of the mine, because the temperature of the mine, as will be seen by the experiment, was 64°; so that there still remained in the shaft 21° above the natural temperature of the mine. That being the case, the boiler fires were lighted and the steam got up and made to blow into the shaft; and then, in addition to the natural heat of the shaft, we had the power of the steam in the shaft without being in the shape of a jet; it was blown off quietly into the shaft, and not in the shape of a jet.

3375. At the same pressure?—At 50 lbs. The quantity of air which was then obtained was 139,176 cubic feet per minute. That gives an amount of rarefying power to the steam of 8,386. The jets were then set on, the steam being at 50 lbs. to the square inch; 37 jets, each three-sixteenths of an inch diameter, were set on; and the quantity of air at 12. 30 P.M., two hours after the jets had been set on, was 149,284 cubic feet per minute, making an increase due to the jets of 10,108 cubic feet per minute. At 2. 30 P.M., the quantity was 150,873 cubic feet per minute, making a difference of 11,697 cubic feet per minute. I should observe, on observing the temperatures in the upcast shaft, one effect of the jets, it will be seen, was to increase the quantity of air, and the quantity of air being increased, consequently increased the intensity of the boiler fires; and there was, therefore, a higher temperature in the shaft. The temperature in the shaft had increased from 98° to 106°. In estimating the increased quantity of air derived from the mechanical force of the jets, you must deduct the effect of the increased temperature of the shaft, by the more vigorous boiler fires. I will afterwards separate that, when I go into the general experiments; because I did not like to depend on one experiment to determine any particular question. Things being in that state, the boiler fires and jets being at work, at 2. 50 P.M., (that is, 20 minutes after the previous experiment was made,) the furnaces were lighted; and at six o'clock, that is, three hours and ten minutes after the furnaces were lighted, the quantity of air was 207,093 cubic feet per minute, which is 56,220 cubic feet per minute over the power of the boiler fires and steam-jets, the temperature in the shaft being now raised by the furnaces up to 164° from 106°. The furnaces were then put out, and the boiler fires damped; and they remained so until six o'clock the next morning, when the shaft was again cooled down to about the same temperature as it was on the previous morning; viz., 85°. This was done with a view of comparing the result of the two mornings; one with the boiler fires and jets over the natural temperature; and the other with the furnaces over the natural temperature; both being under precisely the same circumstances. The shaft, on the 31st October, was cooled lower than on the previous morning; because at ten fathoms from the top of the upcast, on the 30th, it was 83°, and on the 31st it was 79°, midway being the same. The quantity of air on the 31st, by the natural temperature of the shaft, was 104,414 cubic feet per minute; at 6. 30 P.M.; and, at nine o'clock, P.M., the furnace being lighted for two hours and twenty minutes, the quantity of air was 201,960 cubic feet per



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minute, being 97,546 cubic feet of air per minute over the natural ventilation, and 51,087 above the boiler fires and jets.

3376. Will you explain why, on the 13th of October, the temperature in the pit being at 85°, and the quantity of air 130,890 cubic feet per minute, while on the 31st October, under similar circumstances, the same temperature being in the pit at 85°, there were only 104,414 cubic feet per minute?—That arose partly from the upcast shaft not being quite so hot as on the previous morning; and it arose from the temperature of the downcast being higher on the 31st than it was on the 30th. The temperature of the downcast shaft at bank was 45° on the morning of the 30th, and on the 31st it was 52°. Of course there was not the same weight of column in the downcast shaft on the second day which there was on the first.

3377. *Mr. Stephenson.*] I observe that the barometer, on the 30th October, stood at 29·93, and that on the 31st October it stood at 29·75; so that there was some difference arising from the barometer?—Yes; it was at 28·9 in the morning of the 31st; and the barometer being lower, would give a less ventilating power.

3378. Therefore that is quite consistent with the result?—Yes. The next experiment, on November 13th, was made in the presence of several of the Government inspectors: Mr. Mackworth, Mr. Dickinson, Mr. Wynne, Mr. Dunn, and about 20 or 30 mining engineers, who also witnessed the experiments from their commencement to their termination.

3379. *Chairman.*] Were there any viewers present who were connected with the steam-jet system belonging to Mr. Forster?—Mr. Forster was not there, but his engineer was present; and I asked him to attend to the temperature and pressures of steam in the boilers, along with the Hetton Colliery engineer. Mr. Forster had promised that we should see the steam-jet experiments at South Hetton; and I thought it was very desirable that there should be no doubt as to the accuracy of both, and therefore I asked Mr. Forster to allow his engineer to test the accuracy of the experiments at Hetton, and that my engineer should test the accuracy of the experiments at South Hetton. Mr. Forster's engineer was consequently present during the whole of those experiments on the 13th November. The experiments on the 13th November were very full, and I would call the attention of the Committee to the diagram in Plate VII.

3380. *Mr. Locke.*] Were the circumstances just the same under which the second experiment was made?—The mode of conducting the experiment was precisely the same. The jets, in that case, were quarter of an inch jets, instead of three-sixteenths of an inch on the previous days.

3381. Were the boilers the same?—Every thing remained the same except the jets. The three-sixteenths of an inch jets were taken off, and quarter of an inch jets were put in their place; everything else remained the same.

3382. Did the second experiment, tried on the 13th November, confirm substantially the previous experiments?—It did.

3383. You found no considerable discrepancy in the result?—No. I must, however, observe, in reference to those experiments, that it is very difficult to keep the temperature of the shaft at precisely the same amount; there is consequently a slight variation in the different experiments; but the general result is as nearly the same as possible under such circumstances.

3384. There is no striking discrepancy?—No.

3385. Whatever discrepancies there are, will they be seen by comparing the results of the tables?—Yes.

3386. *Chairman.*] You found no great difference between the action of the size of the jets?—No, except that the jets were more powerful in the second experiment. The ultimate quantity of air obtained in the second experiment was 234,118 cubic feet per minute; the largest quantity in the first being 207,093 cubic feet per minute. The diagram in Plate VII. will show the result.

3387. *Mr. Cayley.*] Was the arrangement of the jets the same substantially in both these experiments?—Precisely the same.

3388. And generally speaking throughout your mines?—No, except the Hetton experiments. Figure 8, Plate I., shows the distribution of the jets over the shaft.

3389. In these two experiments the arrangement of the jets was substantially the same, and the results were the same?—The arrangement was generally the same, and the results were precisely the same, except in one case the jets were three-sixteenths, and in the other four-sixteenths of an inch diameter.

3390. *Chairman.*]

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3390. *Chairman.*] There was more power in the last experiment?—Yes; those experiments were made with a view of ascertaining the comparative effect with the natural ventilation, the boiler fires, the steam, and the steam-jets, and necessarily occupied a short time. They were continued a sufficient time, I believe, however, to satisfy every gentleman who was present of their accuracy.

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3391. *Mr. Stephenson.*] Had the amount of ventilation, before you brought each experiment to a close, become as nearly as possible uniform?—Yes. Probably it may be as well to allude to a fact which we discovered, which certainly, at first, rather surprised me, notwithstanding I had made a great many experiments on air; that is, the very great rapidity with which the air currents in the mine was increased in velocity.

3392. And therefore it attained its maximum velocity very shortly after the commencement of the experiments?—It did. This was done with a view of testing the accuracy of a statement which was made by Mr. Gurney, in his evidence before the House of Lords Committee in 1849; wherein he stated, in answer to some experiments which had been made by Mr. Thomas John Taylor, that it required a considerable period of time to put the air into motion. In this experiment, (which was witnessed by all the inspectors; in fact, being one of the experiments made on the 13th November, at the same time the other experiments were made,) the temperature of the upcast shaft was reduced to 74°, and the quantity of air passing through the workings was reduced to 80,182 cubic feet per minute. In that state of things the furnaces were lighted, and they were lighted as rapidly as possible, with the view of ascertaining this fact. There were some tar barrels and other substances put on the furnaces, in order to light them as quickly as possible, so as to ascertain the shortest possible time in which the air could be put in motion. It was a very interesting experiment, because it shows within what time you may increase the quantity of air in any mine. The velocity of the air was ascertained by one of Biram's anemometers, placed in the current of air passing towards the furnace C, in Plate I., the anemometer being placed within 50 yards of the furnace. The experiment was commenced by ascertaining the time within which the air passed 1,000 feet. The experiment commenced at 3 h. 48 m. 47 s. At 3 h. 50 m. the anemometer showed that the air had travelled 1,000 feet, viz., in two minutes and three seconds. It was continued up to 3 h. 56 m. 55 s., the anemometer making four revolutions, equal to 4,000 feet, which the air traversed in eight minutes three seconds. That was before the furnaces were lighted. Fire was applied to the furnaces at 4 h. 3 m., and at 4 h. 12 m. 58 s. the air traversed 4,000 feet in 4 m. and 3 s.; so that in 10 m. 55 s. after the furnace had been lighted the velocity of the air had been nearly doubled; viz., 4,000 feet in 4 m. 3 s. instead of 8 m. 3 s. The experiment was continued. At 4 h. 16 m. 46 s. the velocity described 4,000 feet in 3 m. 48 s.; and at 4 h. 20 m. 30½ s. it described 4,000 feet in 3 m. and 34 s.; so that in 17½ minutes after the fire was applied to the furnaces (because the furnaces did not get into full operation immediately), the air had increased from a velocity of 4,000 feet in 8 m. 3 s. to 4,000 feet in 3 m. and 34 s. That shows the very great facility with which the air can be increased in a mine. The number of currents, and the distance they had to travel, is shown in No. 1, Experiments; and the experiment also showed the very great velocity with the water-gauge increased in power. At four o'clock, before the furnaces were lighted, the water-gauge was 0·45 of an inch; at 4 h. 3 m., when the fire had just been applied to the furnaces, there was an increase of water-gauge; and at 4 h. 23 m. (that is, 20 minutes after the fire had been applied to the furnace) the water-gauge was increased from 0·45 of an inch to 1·75 of an inch; that is, from half an inch, to an inch and three quarters; showing with what very great rapidity, in case of an emergency, the increase of heat in a shaft will more than double the quantity of air, and quadruple the power.

*Vide Experiments, Appendix to Third Report.*

*Vide Appendix to Third Report.*

3393. *Mr. Cayley.*] That is, the ventilation being natural in the first instance, and furnace ventilation being in operation afterwards?—Yes.

3394. Supposing the power of the furnace was insufficient, how would you proceed to increase its power?—The working power of the Hetton furnaces, by the experiments in Table VI., is equal to 1·20 water-gauge; and you will observe, that this was acquired in four minutes after the furnaces were lighted. That is the ordinary working power of the Hetton furnaces. By continuing the intensity of firing, in 16 minutes more we increased the power of the water-gauge, and of

*Vide Experiments, Appendix to Third Report.*

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forcing the air round the workings, to 1.75; so that if I wanted to increase the power of the Hetton furnaces from their ordinary working condition of 1.20 water-gauge, I had only to increase the intensity of the furnace, and I could bring it up to 1.75 water-gauge.

3395. Suppose you wanted to increase it to three inches?—That is a water-gauge which is not attainable in practice.

3396. Can you obtain that heat by the furnace system?—I did, in one experiment at Willington, obtain a water-gauge of three inches, but that was not the working power.

3397. Is that about the extent of the power of the furnace?—It is much beyond the extent. I think it would be very wrong for any furnace to be kept in a working state at more than about 1.2 inch. The ordinary working condition of the furnace should be very much below the power to which you could, in case of an emergency, bring it up; therefore, I say, that the regular working of the furnace should never be more than about 1 inch or 1.20 inch; and then, in case of any emergency, when you require an additional quantity of air, you have a power within yourself of increasing that quantity by a very simple and very rapid process; viz., by raising the rarefying power of the furnace.

3398. Simply by intensifying the furnace?—Simply by increasing the intensity of the furnace.

3399. Is that the only reason why you would work up to two or three inches?—Yes.—

3400. You wish to have the power at your disposal, in case of an emergency?—Certainly; at least I think it is a judicious mode of working a furnace. The rapidity with which the air could be moved, viz., within 20 minutes of the time the furnace was lighted, the quantity of air being increased from 127,145 cubic feet per minute, to 211,193 cubic feet per minute, shows that in the experiments I have detailed, where two hours were suffered to elapse between one experiment and another, the maximum effect had been acquired in one experiment before it was changed to another. But that there should be no doubt as to the practical test of the two systems, I had the two applied at Hetton Colliery for 12 hours continuously. In Table VI., it will be observed that the jets were applied at six o'clock on the 3d July 1853. This experiment was made with a view of testing what the jets could do for 12 hours; so that there should be no doubt as to the working power of those jets at Hetton Colliery. The jets were applied at six o'clock, and remained until seven o'clock in the evening on the same day. Table VI. in the Appendix shows the results, viz. the total quantity of air obtained by the boiler fires, and the 37 jets, a quarter of an inch diameter, was 159,913 cubic feet per minute, measured as going down the downcast shafts; the water-gauge being 0.8 of an inch, and the pressure of steam 40 lbs. per square inch; the temperature of the shaft being 86° 10 fathoms down, and 90° 65 fathoms down. The quantity of coals consumed during the 12 hours was 18,200 lbs., which is 25.28 lbs. per minute, and 6,400 cubic feet of air for each pound of coals consumed, including the air for the boiler fires.

*Vide Experiments,  
Appendix to Third  
Report.*

3401. What is the sectional area of each jet?—There were 37 jets, of an aggregate area of 1,816 inches; the area of the shaft 153 feet.

3402. That will make about four feet of sectional area to each jet?—A little more than four feet.

3403. *Mr. Stephenson.*] Previously to this experiment, had you ascertained what amount of ventilation would be due to the boiler furnaces alone, when the steam was already blown into the shaft?—Yes, I had for a short period.

3404. Would the difference between the former result and this result give you the amount actually carried round the mine by the force of the jet?—It would.

3405. In Table III., which contains the experiment on 13th November, the boiler fires and steam jet blowing into the shaft, the ventilation due to the fires appears to have been 139,847 cubic feet per minute?—Yes.

3406. In the other experiments where you had the jets, you obtained 159,913 cubic feet per minute?—Yes.

3407. The difference between the two is 20,000?—Yes; but in the former case it will be observed that the boiler fires, and the temperature in the upcast shaft, was only 81° sixty-five fathoms down; whereas in the other it was 86° and 90°.

3408. Does

3408. Does the difference between those two numbers rather exaggerate the effect due to the agency of the steam-jet?—No doubt.

3409. By the amount due to the difference of temperature?—Exactly.

3410. *Chairman.*] At eight o'clock, in the experiments at Table VI., you had only 152,000 cubic inches per minute, and the next hour you rose up to 166,000 cubic feet per minute, and you did not go down again; do you think it is fair to include that experiment at eight o'clock, before the whole power had been developed?—I take the whole as being from eight o'clock.

3411. *Mr. Locke.*] Is it not a remarkable circumstance in that experiment, that the temperature of the upcasts was the same, although the amount of air passing was very different?—Yes, but the result must be taken generally.

3412. At eight o'clock it is the same?—Yes; it is very difficult to ascertain the precise quantity of air at any moment having to be measured in these places.

3413. *Mr. Cayley.*] Were the arrangements of the jets the same in all these experiments?—Yes.

3414. *Chairman.*] Will you give the result of the counter-experiments by the furnace?—As I stated before, the Hetton Colliery is ventilated by three furnaces, one nine feet and two eight feet; and I made an experiment 24 hours with those three furnaces; taking the consumption of coal and the quantity of air in precisely the same way as was done with the steam jets. That will be found in Table V. The average effect of the three furnaces at Hetton was 208,466 cubic feet of air per minute for 24 hours, the water-gauge being 1.2, and the temperature 130° fifty-five fathoms down the shaft. In 24 hours the quantity of coal consumed, was 15,960 lbs. in B, B, furnaces, 11,200 lbs. in C, altogether 27,160 lbs., which is equal to 18.86 lbs. of coal per minute, and 11,066 cubic feet of air per minute for each pound of coal consumed. In this case the velocity of the current was very much greater than the velocity of the current by the steam-jets; and of course the resistance being increased, the consumption of coals is much greater. The water-gauge in this case was at 1.20, and in the other 0.80; therefore the last experiment was against the furnace, as to the quantity of coal for each cubic foot of air. The two furnaces were put out, and one furnace only kept at work, with a view of getting, as nearly as I could, the same circumstances with the furnace as with the jets.

3415. *Mr. Stephenson.*] You mean the same velocity of the current?—The same velocity of the current, and the same quantity of air.

3416. *Chairman.*] And the same pressure, and the same water-gauge?—Yes, as nearly as I could. It is very difficult to obtain precisely the same circumstances; but the experiments in Table VII. and Table VI. are as near as possible similar in all respects. The result of one furnace nine feet wide was 164,750 cubic feet of air per minute, and with the jets 159,913; the water-gauge higher with the furnace. The quantity of coals consumed by the furnace was 7,280 lbs., which is 10.11 lbs. per minute; and 16,320 cubic feet of air per minute for each pound of coal consumed; as against 18,200 lbs. of coal consumed by the jets, 2,528 lbs. per minute, and 6,400 cubic feet of air for each pound of coal; the circumstances being, as nearly as possible, the same during the experiments with the jets as with the furnace, and continued twelve hours. It is rather against the furnace, as the quantity of air with the furnace is greater than the steam jet; and therefore, if there is any balance, it is against the furnace. That is the general result of the experiments at Hetton.

3417. *Mr. Stephenson.*] Will you explain Plate VII.?—It is to show the different resistances of the drag of the air in the mine, and of the resistance in the shaft and over the furnace. The drag of the air was measured by the water-gauge placed at the doors between the upcast and downcast; it is described in Plate II., figure 1.

3418. *Mr. Locke.*] You have explained that the water-gauge only shows a difference in the resistance of the air, in passing through the mine, and before it reaches the furnace or jet?—Yes, the drag of the air around the mine.

3419. Is there any other resistance to the air above the drag of the air, which, in your opinion, is material to be taken into consideration in these experiments?—There is also the resistance of the air in passing over the furnace when the furnace is used, and through the boiler fires when the jets are used, the air being compressed in passing over the furnaces with a view of increasing the intensity of the fire; and then there is also the resistance of the air up the shaft.

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3420. *Chairman.*] Have these been taken into calculation in former experiments?—I think not sufficiently. The resistance over the furnaces depends on the contraction which is given to the air, to increase the intensity of the furnaces, and upon the contraction through the boiler fires; but the resistance up the shaft depends on the velocity of the air up the shaft after it is heated by the furnace, and of course will be regulated by the area of the shaft. Hence shafts of smaller area have a greater resistance than shafts of a larger area. I have not gone into any estimate of the difference; and it has not yet been practically ascertained, what diameter of shaft is the best for ventilation. It is rather a complicated question, and probably it is not necessary to go into it now; but it will be found by these experiments that the resistance up the shaft has a very great effect on the aggregate resistance to the ventilating power.

3421. *Mr. Cayley.*] Is the resistance in the ratio of the size of the air-ways?—I suppose the resistance will be in the ratio of the area of the shaft.

3422. Would the resistance be greater as the area was larger or smaller?—Less, as the area is greater; but another element requires consideration. If you have a large shaft, the velocity of the air in that shaft is less than the velocity of the air in a smaller shaft, the quantity being the same, and therefore in a larger shaft the temperature is comparatively less than in a smaller shaft; and therefore you have to balance between the benefit which is gained by the increase of shaft, and the loss which is occasioned by the diminution of temperature.

3423. *Mr. Locke.*] Have you considered the question as to the relative value of the two?—I have not sufficiently considered it to enable me to speak with any certainty upon it; but I have found a shaft of a smaller area has produced a better comparative effect than a larger one.

3424. Would you therefore assume that the diminution of temperature was rather a serious evil in a large shaft?—It is. There will, of course, be an area of shaft which is the best, under all the circumstances; but that I have not ascertained. The velocity of air up the Tyne main shaft was 2,000 feet per minute. That would operate very seriously in the application of machinery for pumping air up a shaft, looking at the immense velocity at which the air is travelling up the up-cast shaft.

3425. That velocity would be at something like the rate of 2,000 feet per minute?—Yes; and in the application of the steam-jet to the top of the shaft, you are obliged to put cylinders on the steam-jets; and if you put cylinders you lessen the area of the shaft; that very much diminishes the effect of the steam-jets, the velocity being increased to 3,868 feet per minute.

3426. To what experiments do you allude now?—Experiments at Tyne Main.

3427. Experiments which you mean to give the Committee?—Yes; where the jets were placed at the top of the pit.

3428. *Chairman.* Have you anything else to state upon your experiments at Hetton?—I have given a diagram on Plate VII., showing the effect of the resistance of the shaft, and the resistance of the drag of the air round the mine, and by that diagram will be seen the comparative effect of the natural ventilation, of the furnaces, and the steam-jets. Speaking of the drag of air around the workings I would refer to Plate IV., which shows the power required to force certain quantities of air round the mine. It will be seen that at a water-gauge of 0.5 of an inch, 123,463 cubic feet of air per minute were forced round the shaft by natural ventilation; and when the water-gauge was raised to two inches, which was four times the water-gauge, 229,918 cubic feet per minute only was obtained, which is not quite twice the quantity of air for four times the moving power.

3429. *Mr. Stephenson.*] Ought the quantity of air to be as the square root of the water-gauge?—Yes. These were practical experiments which were made to ascertain how far it corresponds with what has been the theory of the resistance of air.

3430. In point of fact you draw the conclusion that the quantity of air forced round ought to be as the square root of the water-gauge?—Yes; and it also shows the necessity of not pressing the velocity of the air to too great an effect, and bears out what I have before stated, that you ought always to keep the furnace at as low a water-gauge as you possibly can, otherwise there is a very great diminution of effect.

3431. *Mr.*

3431. Mr. Cayley.] There comes in a resisting power?—Yes; the resisting power of the air being as the square of the velocity.

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3432. Does not that show that there is a tendency to limit the power?—There is no limit to the power of the furnace more than to any other mechanical power.

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3433. If the power of increase can be measured only arithmetically, and the power of resistance is increased geometrically, does not the drag overcome the power?—That depends on the power you use. If you assume a fixed quantity of power, that power increasing, of course, arithmetically, and the resistance increasing geometrically, you come to a balance; but then the stop is in the resistance. You may increase the power in the same ratio as you increase the resistance, and then they go on *pari passu*.

3434. You have never been able to produce more than an effect of two to three inches?—No more.

3435. Mr. Locke.] Does your objection to forcing the air beyond a certain height of the water-gauge, apply to all systems of ventilation?—Yes; the objection applies equally to all systems of ventilating power.

3436. Whether it is the steam-jet or the furnace?—Yes.

3437. And the more you increase it, the greater you increase the expense of effecting the ventilation, whatever system may be employed?—Yes; the resistance increasing, the expense of acquiring that velocity is correspondingly increased.

3438. Would you suggest some other mode of increasing ventilation than the means now suggested, if you found that you were arriving at a point at which the ventilation became so expensive as to be almost at its maximum point?—I think that the ventilation by furnace, or by steam-jet, or by mechanical power, should always be kept within certain limits. There is a working limit to the power. If you want to double the quantity of air, it must be obtained by other means, and not by increasing the velocity of the air around the mine. There ought to be a standard of velocity. If you increase the velocity beyond that, you increase it at the expenditure of power and increase of cost.

3439. Do you think it would be better to increase the airways themselves, or to increase the number of shafts?—Either to increase the area of the airways, or the number of shafts, or to split the air so as to diminish the resistance.

3440. In that case, would you also require a larger shaft, in whatever way you split the air?—Probably; but at the Hetton Colliery we have a ventilation of 210,000 cubic feet per minute. We do that at a water-gauge of 1·20. We have in many collieries only 40,000 cubic feet of air per minute, and yet we have the same height of water-gauge.

3441. Does that lead you to suppose that you could, by applying the same means which you have at Hetton, raise the quantity of air to almost any extent, if you adapt your shafts to suit it?—Yes, by an increase of shafts and by a proper arrangement of air courses, and the power applied; but I would not, in any case, use a water-gauge to force the air round the workings more than about 1·20 inch.

3442. You stated that, in your former experiments, the airways travelled at Hetton Colliery amounted to 97 miles?—Yes.

See Summary to  
Hetton Ventilation-  
Appendix to Third  
Report.

3443. Mr. Baird.] In measuring the quantity of air in a mine, do you measure the quantity of cold air going down, or the quantity of heated air coming up?—In those experiments the quantity of air going down the downcast shaft has been given.

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A P P E N D I X,

Appendix, No. 1.

Appendix, No. 1.

EXPERIMENTS AT SEATON DELAVAL By *Jude* and Others.

SEATON DELAVAL COLLIERY.

15 June 1853.

MEMORANDA relative to Underground Ventilation. Only ventilating power, "Steam Jets," of which there are 33, each jet being  $\frac{1}{16}$  of an inch diameter at orifice. Pressure of steam in boiler 35 lbs. per square inch.

Number of Boilers in use 3.

FIRST EXPERIMENT:

Engine Scale or Fire Drift.

	ft.	in.		ft.	in.
Section 9	6	by	5	8	
	9	7	"	5	6
	9	8	"	5	6

Distance, 30 feet.

$$\text{Velocity } \left( \frac{\text{sec.}}{5} + \frac{\text{sec.}}{5\frac{1}{2}} + \frac{\text{sec.}}{5\frac{1}{2}} \right) \div 3 = 5.3 \text{ Mean Velocity.}$$

$$\text{Then } \left\{ \begin{array}{l} \text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{inches.} \\ 9 \ 6 + 9 \ 7 + 9 \ 8 = 28 \ 9 \text{ and } \frac{28 \ 9}{3} = 9 \ 7 = 115 \\ 5 \ 8 + 5 \ 6 + 5 \ 6 = 16 \ 8 \text{ and } \frac{16 \ 8}{2} = 5 \ 7 = 67 \end{array} \right.$$

$$\frac{115 \times 67}{144} = 53.5 \text{ and } \frac{53.5 \times 30 \times 60}{5.3 \text{ sec.}} = 18,169 \text{ cubic feet per minute.}$$

Then, by setting open the door, and letting the air have free access to the engine-fires, we have the velocities thus— $3\frac{1}{2}$  seconds (mean).

$$\text{Then again } \frac{53.5 \times 30 \times 60}{3\frac{1}{2} \text{ seconds.}} = 27,514.$$

Giving an increase, by the door being open, of 9,345 cubic feet.

SECOND EXPERIMENT:

Victoria Way.

	ft.	in.		ft.	in.
Sections	8	7	by	6	4
"	9	0	"	6	2

Distance, 30 feet.

$$\text{Velocity } \left( \frac{\text{sec.}}{5} + \frac{\text{sec.}}{5} + \frac{\text{sec.}}{4\frac{1}{2}} + \frac{\text{sec.}}{4\frac{1}{2}} \right) \div 4 = 4.75 \text{ mean velocity.}$$

$$\text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{ft. in.} \quad \text{inches.}$$

$$8 \ 7 + 9 \ 0 = 17 \ 7 \text{ and } \frac{17 \ 7}{2} = 8 \ 10 \text{ or } 106 \text{ nearly.}$$

$$6 \ 4 + 6 \ 2 = 12 \ 6 \text{ and } \frac{12 \ 6}{2} = 6 \ 3 \text{ or } 75$$

$$\text{Then } \frac{\text{in.} \quad \text{in.}}{106 \times 75}{144} = 55.20 \text{ and } \frac{\text{feet} \quad \text{cub. ft. per minute.}}{55.20 \times 30 \times 60}{4.75 \text{ seconds.}} = 20,917.$$

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Then again, by setting open the boiler drift-door as before, we have:—

$$\text{Velocity } \left( \frac{\text{sec.}}{3\frac{1}{2}} + \frac{\text{sec.}}{4} + \frac{\text{sec.}}{4} \right) \div 3 = 3.8.$$

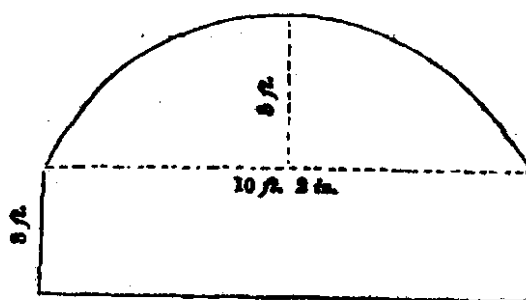
$$\frac{55.20 \times 30 \times 60}{3.8 \text{ seconds.}} = 26,147 \text{ cubic feet.}$$

Giving an increase, by the doors being open, of 5,230.

## THIRD EXPERIMENT.

Big Arch in Engine Plane.

SECTION.



Distance, 30 feet; mean velocity, 2 seconds.

Here 3 feet = 36 inches.

10 feet 2 inches = 122 inches.

$$\text{Then } \frac{36 \times 122}{144} = 30.5$$

$$\text{And } \frac{10 \times 10 \times .7854}{2} = 39.27 \quad \left. \vphantom{\frac{10 \times 10 \times .7854}{2}} \right\} = 69.77 \text{ mean area.}$$

$$\text{Thus } \frac{69.77 \times 30 \times 60}{2 \text{ sec.}} = 62,793 \text{ cubic feet per minute.}$$

Then, by setting open the boiler fire-doors, the velocities were—

$$\left( \frac{\text{sec.}}{2} + \frac{\text{sec.}}{1\frac{1}{2}} + \frac{\text{sec.}}{1\frac{1}{2}} + \frac{\text{sec.}}{2} + \frac{\text{sec.}}{1\frac{1}{2}} \right) \div 5 = 1.85 \text{ mean velocity.}$$

$$\text{Here } \frac{69.77 \times 30 \times 60}{1.85 \text{ sec.}} = 67,884 \text{ cubic feet per minute.}$$

Giving an increase, by doors being open, of 5,091.

## RECAPITULATION.

	Doors Open.	Doors Shut.	Increase.
1. Engine Scale at Fire Drift	27,514 cubic ft. per min.	— 18,169	= 9,345
2. Victoria Way - - -	26,147   "   "	— 20,917	= 5,230
3. Engine Plane - - -	67,884   "   "	— 62,793	= 5,091
	121,545   "   "	— 101,879	= 19,666

Showing an increase, by the fire-drift door being open, of 19,666 cubic feet per minute, or nearly 20 per cent.



## Appendix, No. 2.

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 PAPERS delivered in by Mr. *David Swallow*.
 

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## RULES and REGULATIONS of the Lancashire and Cheshire Branch of the MINERS' ASSOCIATION.

Appendix, No. 2.

Established 7 November 1842.

 REVISED and Adopted at a County Delegate Meeting, held at the Oddfellows' Arms, *Hurstbrook, Ashton-under-Lyne*, 29th March 1852.
 

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*Preface.*

THE objects of this society, in conjunction with those of other counties, and in accordance with the General Rules of the Association, shall be to unite all miners of the United Kingdom, with a view to equalise and diminish the hours of labour; to obtain, by strictly legal and peaceable means, the highest possible amount of wages; and to raise from time to time, by subscriptions amongst the members thereof, various stocks or funds for the mutual support of each other in time of need, as there is no security that the members of any society shall receive the benefits set forth in the rules of such society, unless the society is in possession of sufficient funds. Therefore, it is highly desirable that, in accordance with the following rules, each district commence to accumulate funds as speedily as possible. The objects are, furthermore, to improve and elevate the condition of the working miners and their families; to procure for the miners a more healthful atmosphere to work in; to obtain a sufficient number of sub-inspectors to assist the present inspectors, such sub-inspectors to be practical miners of not less than 30 years of age, and to have worked in coal mines at least 15 years; to obtain an Eight Hours' Bill; to have all coals worked by weight and not by measure, and to secure to our children a proper system of education. To effect such purposes we agree to be governed by the following rules and regulations, and such other improvements and additions as may be made from time to time, legally and constitutionally, by properly authorised parties, and according to the rule, as is hereafter made and provided for. This society shall be called and known by the title of "The Lancashire and Cheshire Branch of the Miners' Association of the United Kingdom;" and for the benefit of its members, it shall be divided into districts and lodges, in such numbers as may be deemed necessary and advisable, and in conformity with the rules provided for that purpose. Every district and lodge of this society shall appoint its own officers, and conduct its own business in the manner set forth in the following rules.

All grades of miners are eligible to become members of this society.

Whilst all classes are experiencing the necessity of extended organisation, some individuals are still retaining their old prejudices and narrow-mindedness of sectional unions, and creating prejudice amongst miners whose interests are identical; if one suffers the others must feel it. Not only are the most enlightened trades' unions experiencing the necessity of general union, but Odd Fellows and other benevolent societies have seen the great and urgent necessity of extended organisation. Alas! how frequently does it happen that a man has paid a great number of years into societies, in the fond hope that he would be relieved by its funds in time of sickness and distress; but, when he applies for the amount set forth in the rules, he discovers to his great dismay that sick pay is either greatly reduced, or stopped altogether, whilst other lodges in the same district have no sick at all, and are accumulating funds daily. Yet all are members of one society; all are called by one name; and the rules of the society require that they should call each other brother; but we must confess we can see no brotherly love in it, one starving and the other adding to his funds. It is impossible to enter into this subject in detail here; but, on referring to a table published by the board of management of the sick union of the Preston district of Odd Fellows, Manchester Unity, I find that there two lodges, ending the two years on 31st April 1850 and 1851, have no sick members at all, whilst others have expended 49s. 10½d. a member, and the funeral fund besides; whilst each man only paid into the funds of the society in two years 34s. 8d., leaving the funds minus 15s. 2½d. in two years, besides the money paid for funerals, which varied in different lodges for the year

Appendix, No. 2.

ending 9th April 1851, from 15 s. 9 d. to nothing at all; but on the whole district it only cost for funerals 4 s. per member, and 12 s. 8 ½ d. for sickness. Although some lodges were so very heavily pressed upon, the whole district added to its funds 7 ½ d. a member. If we had room for the tables referred to, they would amply illustrate the folly of sectional unions.\* The individuals who are most opposed to a general union acknowledge that the broader basis of any society the better; also that sectional unions cannot do any lasting and permanent good. They will then turn round and say, We know that a general union would be the best if it were honestly carried out and fairly dealt with; and they will ask, Was the last fairly dealt with? To this we reply, No, it was not, it was scandalously abused; but by whom was it abused? The answer is, By the very parties who are now the advocates of sectional unions. Who advocated the crying abuses of the law fund, the travelling committee, &c., with all their abuses; Who were they, do you ask? Why, the sharers of the plunder and partakers of the spoil, and the parties in question. Are there any men who have laboured and done their best to remove those evils? So have we. Are there any parties who intend to keep a sharp look out and see that the same practices are not permitted to occur again? So do we. We are determined to prevent the evils of 1844-5, 6, 7, &c. The same parties, when they see they cannot be permitted to play the old games, are like the old fox in the fable; when he could not get the grapes he turned round and said he would not have them because they were sour.

It is not our wish to impose on either the good sense or the prejudices of any one; at the same time we are in justice bound to remark that many who, through ignorance, were opposed to our views, are now members of our society, and are its most zealous advocates and constant supporters; many, since the establishment of our society, having both seen and experienced the beneficial results of our system, have acknowledged its superiority over any other previous society of miners with which they had been connected.

We hope no prejudices will arise in the breast of any one from the many unsuccessful attempts to establish a permanent society amongst miners, since those failures only tend to point out the errors that have thwarted the good intentions of their founders and supporters.

That a society ought to exist amongst miners we think few will deny, and for this purpose we fondly hope that every miner will see it his duty and interest to come forward and join us.

A few there may be whose contracted hearts refuse to expand with benevolence towards a brother miner in distress, who consider themselves in permanent situations, and think that they will never stand in need of the helping hand of others. We would only call upon such to bring to their recollections how many instances have come within the sphere of their own observation of individuals, lodges, and districts who have thought themselves secure, and yet have fallen when there was no one to help. We have no other end in view than a wish to see a permanent society established, and funds raised adequate to withstand the inclement blasts of adversity and oppression, and that its members may outvie those of similar institutions, and their children have occasion to bless the exertions of their forefathers.

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## RULES.

### *How County Meeting to be held.*

First Rule. THAT the county meeting be held at such stated times and periods as may be deemed necessary and agreed upon by the delegates, and each county meeting shall have the power of fixing where it shall next be held; but no meeting shall have the power of fixing more than the next succeeding meeting.

### *Duties of Delegates.*

2. That each district shall appoint one or two delegates to attend each county meeting, whose business shall be to transact all the general business of the society in connexion with the two counties, in the name of and for the districts they represent; such as electing officers and agents, fixing the rate of wages, appointing the routes of the agents, taking an account of their labours, fixing the levy for each member to pay at the next county meeting, according to the 14th rule, making such rules from time to time as may be deemed necessary, according to the provisions of the last rule, and in accordance with the spirit and meaning of these rules; to inquire into the state of the markets and stocks of coal in each district, average wages of each colliery in each district, the state of ventilation in each mine; to order petitions to Parliament for the appointment of sub-inspectors of mines, for an eight hours' Bill, for all coals to be worked by weight and not by measure, to get a proper system of education for the miners' children, or any other matter connected with the welfare of the miners; to take cognizance of any proposed alteration of wages in any district, to devise plans

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\* See Lectures on Friendly Societies, their History, Progress, Prospects, and Utility, 1851, by Mr. Charles Hardwick. Sold by all booksellers.

plans and means of preventing reductions of wages, if possible; to have power to order statements to be sent to the masters in those districts where this society extends, soliciting an advance of wages at proper times and seasons, and to do such other matter or thing as may be deemed necessary to promote the interests of the miners generally.

*Duties of President.*

3. That the county meeting shall be governed by a president (and vice-president if necessary). The president shall be elected either from the delegates then present or from among the officials, at the discretion of the delegates, to retain office three months. The duty of the president shall be to preside over the meeting to preserve order, and to see that the discussions are conducted according to the usual rules of debate. The proposer of any motion to be allowed to speak 10 minutes upon his proposition, if he requires to do so; and each delegate five minutes. The officials to be allowed to speak upon any motion, and to give their advice freely upon any subject; to be governed by the same rules of debate as the delegates, but not to vote, move, or second any resolution. No one to be allowed to speak twice until every one present has had an opportunity of speaking once on the subject, if they choose. The order of speaking to go the sun way about. Any one being out of order and disobeying the chairman, when called to order, shall be fined 1*d.* for each offence.

*Duties of Financial Secretary.*

4. There shall be a financial secretary elected by the delegates at the county meeting, who shall be retained in office so long as he gives general satisfaction. He shall furnish quarterly, and oftener, if necessary, and ordered to do so by the county meeting, an account clearly and accurately setting forth the income and expenditure of both the expense-fund and victim-fund separately. He shall keep his books and papers in such form and manner as the delegates may order. He shall receive the sum of 10*s.* per fortnight for his wages; if the county meeting lasts two days, he shall be paid one day's wages extra. He is to be paid his coach fare to the county meeting and home again, over and above his wages.

*Duties of the Treasurer.*

5. The treasurer to have 5*s.* per fortnight; if more than one day at the county meeting, he shall be paid extra, and also be paid extra for any other work that he may do besides his office of treasurership, at the same rate that other people are paid; to be paid coach fare same as secretary, and to be governed by the same rules. The duties of the treasurer shall be to receive all the moneys of this society, and shall pay them according to the orders of the county meeting, and not otherwise. All moneys paid without the sanction of the county meeting shall be refunded. He shall give such security for the moneys in his hands as the society may deem proper.

*Duties of Corresponding Secretary.*

6. The corresponding secretary shall be elected as the other officers are, and subject to the same rules. His duties shall be to keep up a correspondence with Members of Parliament and other parties on the subject of a short-time Bill, getting coals by weight, appointing sub-inspectors of mines, education for miners' children; to correspond with other counties, to write letters in newspapers, and answer all letters on the business of the society. Either the financial secretary, treasurer, or registrar may be elected to this office if the majority think proper; or any other individual may, not holding any other office, at the discretion of the delegates. He shall be paid such sum for his labour as a majority of delegates may deem proper.

*Duties of Registrar.*

7. That a registrar be appointed, to be governed by the same rules and conditions as the other officers, whose duties shall be to register every member's name and contributions in a book kept for that purpose. Every lodge secretary shall forward, once per month, in a book or paper provided for that purpose, the amount of subscriptions paid by each individual for county fund and victim fund separately, which sum shall be correctly entered in the book, so that the delegates at the county Board can tell when an individual who is proposed at the county Board is entitled to victim pay, and whether he is a legal member or not, as a great number of persons have received victim pay on former occasions who were not entitled to it. Any of the officers named in the three last rules either may or may not be elected to act as registrar, at the discretion of the delegates; to be paid for his labour according to his work, the delegates to fix the rate of wages for such work.

*County Fund and Victim Fund to be kept Separate.*

8. That the general-fund money and victim-fund money shall be entered in the secretary's and registrar's books distinctly and separately; the income and expenditure shall also be published separately in the balance-sheet, and the secretary shall give to each delegate a receipt for the moneys paid into the hands of the treasurer, such receipt to set forth how much money has been paid to each fund. The county-fund levy at no time to exceed one penny per week.

*Election of Agents, &c.*

9. The county meeting shall elect such number of agents from time to time as to them shall seem needful, for the purpose of advocating the interests of the society; and they, like the other officers, shall be entirely under the control of the county meeting, and shall visit such districts as they are ordered and appointed to, and hold meetings, and attend to such other matters as may be needful. That no person shall for the future be elected as agent, or to any other office in this society, unless he has had at least 10 years practical experience as a miner, so as to be able to illustrate and explain the grievances in a proper and intelligible manner.

*Slander.*

10. That any member slandering or impugning the character of any agent or other officer of this society, without just cause, shall be fined two shillings for each offence. Officers or agents proved guilty of the above-named offence shall be liable to the above-named penalty.

*Time before entitled to Benefits.*

11. That no person be entitled to any support from the funds of this society until he has been a member of the same not less than eight weeks, and must have paid up all dues and demands to the lodge, district, and general fund, except those who may be discharged for becoming members of this society, going on any deputation, delegation, or advocating the principles of the society, or attending as delegate at any meeting; provided that the person so getting discharged for any of the above-named offences has been authorised by any properly authorised parties to perform such acts. *N.B.*—No person will be entitled to the benefits of this rule who has not paid at least once before he gets discharged, or notices of his discharge. Men will not be supported under the provisions of this rule for frivolous things of any sort; if they leave their work under any other conditions than according to the 12th and 13th rules, they must take the responsibility upon themselves.

*Strikes.*

12. That no colliery or pit set of men, or any portion of a pit set of men, shall be permitted to stop work or turn out without the consent of five-sixths of such pit or colliery. When five-sixths of the members at any pit or colliery shall have come to a decision that they have a just cause to cease work, they must call, or else cause the district secretary to call, a special general meeting of the district, if the matter should be of urgent importance that it cannot lay over until the regular district meeting, to submit the grievance of such pit or colliery, along with the decision the men have come to upon the matter; the district meeting to enter fully into the subject, and, if it be thought desirable to have arbitration to appoint the same from some members working in the same mine at any colliery either in their own or neighbouring districts; also to make what inquiry and investigation they think proper and advisable; and if after a full and fair investigation the district be of opinion that it is a fair case to send to the county meeting, then they must forward it there, with a full explanation, so that the delegates may take it back to the districts, and bring a decision to the next county meeting whether the men must cease work or not. If after it has been before all the districts, the majority are of opinion that it is a just case in which to cease work, then the men so stopped according to the orders of the board, shall be supported at the same rate as other victims, from the general victim fund, levied and paid for such purposes, in the same manner and on the same terms and conditions as other victims are paid as set forth in the rules. But if after a full, fair, and impartial investigation, the judgment of the county meeting should be against the decision of the men in the matter in question, and the men should stop or cease work in opposition to such decision, then they shall not receive any support from the general victim fund, and must take the responsibility on themselves. No pit set, or any portion of a pit set of men, nor colliery, will be allowed to turn out by this board until they have got 10s. per man in their funds, and boys in proportion.

*Instructions and Rules for Persons becoming Victims.*

13. That members who have paid not less than eight weeks' contributions, and are clear on the book, shall receive an equal share of victim pay along with the other victims, from the general victim fund, in accordance with the following regulations: If a man's life be in positive danger, either from explosions, black-damp, want of props, sudden inundations of water, or bad ropes, he shall be permitted to cease work immediately, if he thinks proper; but be it therefore clearly and distinctly understood, that no man will be permitted to leave his work on account of bad place, alteration of system of working, or any of the thousand-and-one frivolous things that have been urged on former occasions, until he has complied with the following orders: as soon as a free member has a real grievance to complain of, before he leaves his work he shall go to the secretary of his colliery or pit and lay the case before him, who shall call a meeting of the members of such pit or lodge, and they shall have full power to make a proper and searching inquiry into the whole affair; and if the lodge, or as many members as can be got together after proper notice, think

think that it is a fit case to go before the district, then the delegate to the next district meeting must take it there: and if the districts think that it is a fit case for the county board, they must send it in a proper manner, and all particulars along with it; and if the county board sanction it, then the person shall be permitted to cease work and have support at the same rate as other victims. If either the lodge, district, or the county are of opinion that the matter can be settled by arbitration, they are hereby empowered and instructed to appoint the same, on the same terms and conditions as are set forth in the 12th rule, in regard to strikes.

*Amount of Contributions, and how used.*

14. That it is highly desirable that each district should begin to accumulate funds as soon as possible, as there is no guarantee nor security for any member of any society without adequate funds; therefore it is deemed advisable that the members of this society should pay 6 *d.* per week, or 1 *s.* per fortnight, during the present year, to be disposed of as follows:—To be added to the funds at home, 5 *d.*; general fund, not to exceed 2 *d.*; victim fund, at county board, 2 *d.*; lodge and district expenses, 1 *d.* If 2 *d.* per fortnight more than meets the demands of the general fund, the delegates shall have power of reducing the levy to a proper amount. The delegates at the county meeting shall not have the power of raising the levy at such meeting, until the second county meeting, after a motion has been made to that effect. When a motion is made at the county meeting for an advance in the levies, it shall go back to all the districts and lodges; general meetings must be called to consider the propriety of granting it or not; and all votes for raising the levy at county board must be taken by proxy, 28 days after the motion is made, so that all parties can have the whole matter laid before them, and, if they choose, have a voice and vote in it. *N.B.*—All money for ale and liquors must be paid over and above the 1 *s.* per fortnight.

*Entrance Money, &c.*

15. That any person becoming a member of this society must pay the same amount for entrance money as the members have in the funds per man, one fortnight's contributions, and 2 *d.* for a copy of these rules; the above law to be in operation only during the year 1852. All persons entering after the close of the present year must pay a premium of 3 *d.* per shilling, besides the sums named above; each district to charge as much more than the above-named sums as they may deem wise and prudent, to be added to their own funds at home, which funds are to be deposited in some safe and secure bank, in the names of three trustees, to be chosen by the men themselves. It is very desirable that one of the officers of the society should be chosen as one of the trustees, so as to prevent the money from being drawn out for any other purpose than that for which it was contributed; the district to have the full control of the funds, where they shall be deposited, and how disposed of, at all times. When any money is wanted out of the bank, the three trustees shall sign a proper cheque for the amount, and at least one of them shall accompany to the bank the person who is authorised by the district to receive the money, so that he may be a witness to what is transacted.

*Victims, how paid.*

16. That victims of every district shall be paid in such form and manner as the delegates at the county board may deem proper. They shall send the victims' pay either by the delegate from the district, or by one of the officers, or by any other delegate or member from any other district, or by post-office order, as to the delegates may seem wise and prudent; but the victims shall be paid at least once in 12 weeks by some other person than by their own district officers. Every victim's name shall be sent to the county board every fortnight, and shall be published once every eight weeks, with the whole time they have been victims, the amount of money received during the eight weeks, and the whole amount since they became a victim, from both county and districts. All victims, residing within three miles of the place where the county meeting is held, shall fetch their own money from that meeting, which money shall be paid by the financial secretary or treasurer, either in the presence of one of the other officers or a delegate or other person from a neighbouring district. Each victim to draw his own money, except in the case of boys who are members' sons, when the father will be permitted to draw for the whole family. If a person be away from home in search of work, he must send a letter, or else leave a written statement, authorizing either his wife or other member of his family to draw his pay; any person going away from home and wanting his pay forwarding to him, must send a note to the county meeting, signed by some district lodge secretary, to certify that he is not working. That no victim receive more than 13 weeks' pay in succession, except in the case of a strike; if any one is victimized at the termination of a strike, the 13 weeks to commence from the termination of such strike.

*Victims' Contributions when Sick, &c.*

17. That members who during the time they are victims may become sick or lame, or be playing them, shall only pay general fund and district money.

*Arrears and Re-entrance.*

18. Any member allowing his arrears to exceed eight weeks' contributions shall not be entitled to any support from the funds of this society until he has paid his arrears and four weeks have expired from the time of clearing himself on the books; any one in arrear may, at their own option, either pay up their arrears according to this rule, or re-enter as new members, according to rule 15.

*Restriction.*

19. That as far as it may be practicable the system of restriction shall be acted upon; and all officers of this society shall at the various public district, or other meetings of the society, urge upon the men generally the necessity of acting in accordance therewith, by showing them the good that will necessarily follow from their not sending too many coals into the market.

*Boasting about Work, telling Tales, &c.*

20. That if any member of this society shall, in a boasting or swaggering manner, tell other people how much money he has earned in a short time (which has too often been the case, and proved very injurious to the coal-miners), on just proof before his lodge, he shall be fined 2 s., which, if not paid within one month, shall be added to his contributions, and put down as arrears.

*Victims to meet every other Day.*

21. That every member receiving support from the funds of this society shall attend at a certain place every other day (with the exception of Sunday) to enter his name in a book kept for that purpose; the districts to have power of fixing the place and time of meeting. Any victim not attending at the proper time without a lawful reason, shall forfeit one day's pay. Every victim shall, when ordered by any of the recognised officers of this society, do any work that they may require them to do, providing they are qualified to do such work, such as posting bills, warning meetings, getting petitions signed, &c. Any victim refusing to obey such orders shall be fined 1 s. 8 d.; but the officer shall sign him a certificate that he has done such work, and he shall receive 1 d. per mile to defray his travelling expenses, from the county board. Lodges and districts to have the same power as officers over victims.

*Frauds.*

22. That any member who may fraudulently draw or misapply any money belonging to this society, shall either refund the same, or be prosecuted by the parties so defrauded; the lodge, or district, or county, if they agree to let him refund it, shall determine what sum he shall refund per fortnight.

*Ballot.*

23. That all votes be taken by a show of hands at the county or district meetings, unless some one delegate desire the ballot; and if any delegate desires the ballot he shall have the power of claiming it; and when it is taken upon any subject of importance, the votes must be recorded, so that each district may see if their representative voted according to their instructions.

*Clearances.*

24. That clearances be provided by the county board, and supplied to the districts; so that when a member is necessitated to remove from one county to another, or from one district to another, or from one lodge to another, he shall draw a clearance from the lodge he belongs, and must pay all dues and demands up to such lodge for his clearance, and present the same to the lodge belonging to the colliery he goes to work at, within one month after commencing work, or be fined 2 s. to the lodge for such neglect. All clearances to be duly stamped with the district seal, and none others to be considered genuine.

*Appeal.*

25. Any member being dissatisfied with the decision of his lodge or district, may appeal to the county board, the decision of which shall be final.

*To be divided into Districts and Lodges.*

26. That the two counties shall remain as at present, divided into sub-districts; each district to elect a sub-secretary and sub-treasurer, whose business shall be to keep the accounts of the district to which they may belong, and to transmit the county levy to each county meeting, for delivery to the county treasurer, and the items to the county secretary, for insertion in the county books. All district officers to be paid in such a manner as the districts may think proper.

*Government of Districts and Lodges.*

27. That districts shall have power to elect their own officers for their own government, and to make their own bye-laws; but all bye-laws to be strictly in accordance with these general laws.

*Propositions for County Meeting.*

28. That no business be entertained by the county delegate meeting, unless a proposition in writing, signed by the district secretary, and stamped with the district seal or stamp, be given to the chairman, certifying that such business has been duly investigated by the district from which it emanated, and a majority of the members of such district record their opinions that such business should be decided at the county meeting.

*Lodges leaving one District to join another.*

29. That districts shall be composed of two or more lodges, as most convenient. Any lodge desirous of leaving one district to join another must give six weeks' notice to the district they belong to of their intention to do so, and must pay up all dues and demands to the said district, according to rule; then the district secretary shall sign them a certificate of their having paid up all dues and demands to the district they are leaving; but if, after obtaining a certificate, the district they intend to join should refuse to have them, the district from which they received their certificate shall take them back again.

*Dividing of Funds.*

30. That no lodge or district belonging to this branch of the Miners' Association shall be broken up so long as there are three members true to each other in such lodge or district.

*Arrears.*

31. That any member being eight weeks in arrears shall not be allowed to vote upon any subject connected with this society.

*Violation of Laws of Land.*

32. That this association will not defend or support any member who shall in any way violate the laws of the country.

*Victims not to receive Support, if they refuse to Work at a lawful Place.*

33. That if any brother miner can find any victim or victims work, and they refuse to work, such victim or victims shall not receive any more victim pay.

*Contributions of Members not in full Work.*

34. That those who only work six days in the fortnight shall pay one penny for general fund, and half of the regular fortnightly levy to the lodge, district, county, and victim funds besides; but if they work eight days, they shall pay a full fortnight's levy; if they play the whole fortnight they shall only pay the district and county levy.

*Alteration of Laws.*

35. That these laws shall not be altered or rescinded, or new ones made, without giving one month's notice to the county secretary, who shall inform all the districts of the proposed change, so that each district and lodge may have time to consider such alteration or new law, give their calm and deliberate opinion thereon, and vote accordingly.

## Appendix, No. 3.

PAPER delivered in by Mr. *W. Gray*.

## STEAM JET VENTILATION.

Appendix, No. 3.

THE Morfa was worked in 1849 with only one pit, divided by 3-inch plank brattice, into winding shaft on one side and pumping shaft on the other side; winding shaft was the down cast of 50 feet area; pumping shaft the upcast of 25 feet area: making an allowance for pumps, rods, beams, &c., the upcast would not exceed 18 feet area. The ventilation was worked by high-pressure steam, a culvert leading from the upcast to a stack 60 feet high, with 16 feet area at the top, with the jet pipes 8 feet from the bottom of the stack, 75 jets of  $\frac{1}{2}$ -inch square, worked by two Cornish boilers 30 feet long by 6 feet diameter, burning three tons of coal per 24 hours, steam worked up 50 lbs. per inch pressure; and according to Biram's anemometer, measured—

19 December 1849	-	-	-	11,600 feet per minute.
30 December 1849	-	-	-	13,104 feet per minute.
17 February 1850	-	-	-	14,300 feet per minute.

Averaging about 13,000 feet per minute; this plan of applying the steam was abandoned.

To apply the blast pipes, a chamber was built 10 feet high, with sufficient area for 35 blast pipes 10 feet long, 5 inches diameter, the bottom part coned out to 10 inches diameter at the bottom or receiving end, 35 jet tubes 12 inches long served perpendicular into the horizontal branch pipes, and each jet reaching 12 inches up the blast pipes, and about two inches above the cone, or two inches into the parallel part of the blast pipe; 18 of these jet tubes were  $\frac{3}{8}$ -inch area and 17 tubes  $\frac{1}{2}$ -inch area, worked from the same boilers at 50 lbs. pressure per square inch, and burning three tons of coal per 24 hours, and measuring according to Biram's anemometer—

20 June 1850	-	-	-	-	19,000 feet per minute.
1 July 1850	-	-	-	-	18,000 feet per minute.
14 September 1850	-	-	-	-	21,300 feet per minute.

Averaging about 19,000 feet per minute, this gave us an increase of 6,000 feet per minute over the jets merely going into the stack. The air was split into four divisions; average length of air course 1,300 yards of about 36 feet area each, which is about 4,077 feet of air per minute for one lb. of coal consumed.

**RULES and REGULATIONS to be observed by the Workmen employed at the Morfa Colliery.**

MORE than six men are in no case to ride at one time, and the engine-man is to lessen the speed of the engine to one-half.

The firemen are to enter the colliery every morning at a sufficiently early hour to enable them to try each stall where a man is required to work; and, having done so, to report to the overman the state of the colliery before the arrival of the men. As an additional precaution, should they find any stall dangerous, they are required to fix a signal board, with the words "No person to enter this stall."

The cutter is required to see either the overman or fireman before proceeding to his work. Should the cutter at any time consider that his stall is in a dangerous state, he is at once to leave it, and report the same to the overman.

The onsetter must send all the men and boys up the pit before he leaves the pit bottom.

The bankman must not leave the top of the pit until the onsetter has come to bank.

No cutter or trammer is allowed to use a safety-lamp without its being first examined by the lamp inspector, and then locked, and again re-examined by the overman or fireman.

Should any accident happen to a lamp while in use, by which the oil may be spilt upon the



the gauze, or by which it might in any other way be rendered unsafe, it is immediately to be taken out to the station fixed upon by the overman, and not again used until after having been properly examined by the overman or fireman.

Any cutter, trammer, or workman, on the appearance of fire-damp, is to retreat to a pure atmosphere.

All persons to whom the safety-lamp is entrusted are strictly prohibited from interfering in any way whatever with the lamp, beyond the necessary trimming of the wick with the picker; and the lamp is not to be placed within three feet of the side of the goaf, and not nearer the face of the coal than five feet.

Should any cutter, trammer, or other person, when in charge of a safety-lamp, lose his light, he is to take it to the station fixed upon by the overman, to be relighted; and, when relighted, it is to be examined and locked by the fireman before being again used.

It is particularly requested that any person witnessing improper treatment of the safety-lamp, will give immediate information to the overman in charge of the pit, in order that proper steps may be taken to guard the lives of the workmen employed in the mine.

Smoking is not allowed in any part of the mine; and persons found so offending will be liable to a fine of 10s., or be taken before a magistrate, and the fine to be paid to the informer.

No candle to be taken nearer to the pillar working than the station fixed upon by the overman; and any one found with a lighted candle within that distance will be fined 10s., the fine to be paid to the informer.

On no account is any person to keep a gun or dog of any kind.

No person is to have any description of gins, traps, or nets used for snaring game; and, if found with any, he will be fined 15s.

No one not connected with the colliery will be allowed to remain about it, and the time-keeper will be fined 2s. 6d. for each person so offending.

The workmen that are employed at the colliery are required to keep the direct road, and in nowise to trespass on the land by coming to or going from their work; and if found so trespassing will be either discharged or fined.

*Caution to all that are Working in the Pits at the Morfa Colliery.*

1. Any person found smoking tobacco, or has in his possession pipes, tubes, cigars, or lucifer matches within these pits will be fined one guinea.

2. All blasting powder to be discharged by the overman or deputies.

3. Any other person in the coal-working district of the colliery discharging blasting powder will be heavily fined.

The plans and section represent the working veins of coal. The principal vein is called the Nine Feet Vein, but generally 11 feet thick, being with a very strong bottom; the top is black shale, two feet thick, which is very soft loose stuff. Upon strata, is a very strong cliff, with lines of rock. This vein generally runs 11 feet thick; seven feet of coal is taken away in the stall until holed at the top; and the top coal brought back.

Average run of air about 3,000 yards.

South Fawr Vein has a very soft bottom; puck very much. Shaley coal mixed through the thill. Pretty good top.

North Fawr Vein has a very fair bottom and top.

The ventilation is carried on by the splitting system.

The air is divided at the pit bottom; one part goes west and ventilates a vein not at work, known as the Four Feet Vein; the next is a main split, one part going north to air South and North Fawr Veins; it there splits again, one part to the South Fawr, and the other part to the North Fawr, both returns are brought into a return drift, and joins the Four Feet return, and keeps the course to the furnace. The other part is taken 300 yards through a stone drift, 70 feet area, and splits east and west. The air has a double run east, or two intakes, and two returns at the highest part of the work by two returns left near the crop with the first pillar left below to support the return, so that any gas flowing from the edge of the goaf as the angle of the vein is generally 20 degrees. No gas can remain in the excavated part, but this support pillar must be taken out eventually, and the whole laid down after no district is left behind.

Three years ago we had an explosion, in which seven men lost their lives. One man since killed by a fall of coal. One with not getting properly into the cage or carriage coming up the pit.

Three at different times on the surface railway. One of these, a stoker on the locomotive; another was run over by the locomotive at night, he being very deaf. The other trying to get on to the train when in motion, and fell under the wagon.

*Description of Furnace.*

The ventilation is by furnace.

The height of the furnace 10 feet under the fire arch, and one foot between fire arch and protection arch, to prevent the upper strata from taking fire.

Breadth of furnace, eight feet; about six inches of masonry on each side of the fire bars, to prevent burning the main arch; reducing the breadth of the fire to seven feet. Length of bars 9 feet 6 inches, making 66½ feet superficial. All the surface cannot be covered with fire, say 60 feet of working space, burning about 2½ tons of coal per 24 hours, producing 68,500 per minute, which is rarefied from 62°, before going on to the furnace, to 163°, 20 feet from the top of the upcast pit. Three-fourths of the air is carried over the furnace, and one-fourth taken into the upcast by a separate drift, generally called the dumb drift. This air joins the hot steam from the underground engine.

Temperature of air before getting into the furnace, 62 degrees.

Temperature of air at the top of furnace, before entering the shaft, 230 degrees.

Temperature at middle shaft, 40 fathoms, 195 degrees.

Temperature at top of upcast shaft, 163 degrees.

Temperature at the bottom of downcast shaft, 58 degrees.

Water-gauge, nine-tenths of an inch, equal to five lbs. per foot.

17,655 feet of air per minute, heated from 62 degrees up to 163 degrees, at the top of the pit, by one lb. of coal.

Steam to work an underground engine is brought down the upcast pit from a boiler at surface; this steam to some extent heats the air, and adds to the ventilation.

*Section of Pit.*

Upcast pit is sunk at a distance of 300 yards, full rise of the measures from the downcast, bearing S. 39 W. Distance under ground is much more by bearing level course 100 yards, and 300 yards full rise, and 100 yards back to the pit, which makes the distance 500 yards to travel from pit to pit. As the vein lies at an angle of from 20 to 30 degrees, the vein at the bottom of downcast pit crops at the gravel before reaching the upcast. The upcast pit cuts the present working Nine Feet Vein between 60 and 70 fathoms from the surface, as shown on section.

The furnace is placed at the depth of about 60 fathoms from the surface; in this vein of coal, about 70 yards from the ingate of upcast pit.

The upcast pit is tubbed off at the depth of 30 fathoms, by fire-bricks and lias lime; the other part is walled up to the tubbing, making the whole distance walled from the furnace area of upcast, 90 feet. Downcast is tubbed off at 20 fathoms from the surface, divided into winding and pumping pits, making 70 feet area in both.

*Expenses on Safety Lamps.*

To Maintain and keep in Good Repair a sufficient number of Safety Lamps, to work 100,000 tons per Annum.

	£.	s.	d.
220 lamps in daily use on 300 working days per annum, 1,050 gallons of oil, at an average of 2s. 10d. per gallon	148	5	-
60 new lamps per annum, at 6s. 3d.	18	15	-
70 lbs. of fine cotton, at 1s. 4d. per lb.	4	13	4
Wire-gauze, wire for poles, solder, tools, &c.	10	-	-
Wages: to oiling, trimming, and keeping the same in good repair, at 12s. per week	31	4	-
To locking lamps, under ground, 300 at 6d.	7	10	-
£.	220	7	4

Cost of each light per day, '80 d.

*Expenses on Candles.*

	£.	s.	d.
To maintain 220 lights per day:—180 workmen, averaging 10 hours per day, using six candles each, of 30 to the pound; 40 boys averaging 12 hours per day, using seven candles each of 30 to the pound, equal to 45½ per day, at 6d. per pound, by allowing 300 working days per annum	340	-	-
Wages to one man for taking charge of these candles, and serving them out, at 12s. per week	31	4	-
£.	371	4	-

Cost of each light per day, 1'34d.