

large quantity of dry coal-dust in a mine entirely free from firedamp. It has been known for many years that dry coal-dust in the presence of firedamp greatly increases the force or intensity of an explosion, but many of our mine-managers will not admit that coal-dust alone is explosive, although they must know that such dust contains carbon and a certain percentage of sulphur. The experiments conducted by Mr. Hall show conclusively that in some instances dry coal-dust is a highly-explosive substance even when entirely free from firedamp, and, that being the case, no explosive should be allowed to be used in a coal-mine where there is dry dust known to produce flame by a blown-out shot, and blasting-powder is known to be one of the explosives which is most likely to do this. Indeed, there is no explosive yet tested which can be considered to insure perfect safety, but the danger can be minimised by using those which do not readily produce flame. The French Commission recommend a dual explosive, such as 30 per cent. of dynamite and 70 per cent. of nitrate of ammonia. Bellite is also mentioned as an explosive not likely to produce explosions, namely: 17 per cent. of dinitro benzol and 83 per cent. nitrate of ammonia, or any explosive that develops a temperature of detonation as low as possible, and in all cases less than 3,992° Fahr.

The following is an abstract of Mr. Hall's official report, taken from the *Colliery Guardian* of the 28th of November last:—

“The first series of experiments was carried out in a disused pit-shaft 50 yards deep and 7ft. in diameter. A cannon 2ft. 6in. long, with a bore of 2in., was fixed at the bottom of the shaft and pointed upwards, and the air in the shaft was then saturated with fine coal-dust, which had in some instances been collected from underground roads and in others from the pit-screens. The cannon was fired by electricity, with the dust in suspension in the shaft.

“The following table shows the results of experiments made:—

No. of Experiment.	Date on which Experiment was made.	Temperature half-way down the Shaft. Deg. Fahr.	Approximate Quantity of Dust used.	Weight of Explosive in Pounds. P., Gunpowder; R., Roburite.	Results.	Name of Mine or Colliery where Experiments were conducted.
1	1890. April 30	Deg. 67	Cwt. 2	Lib. 3 P.	A.	White Moss Colliery Company's near Ormskirk.
2	" 30	57	2	1 P.		
1	May 21	70	2½	1 P.	B.	White Moss Arley Mine.
2	" 21	68	2½	¼ R.		
3	" 21	60	...	1 R.		
4	" 21	60	3	1 R.		
1	June 26	70	3	1 P.	C.	Southport Pit—depth, 130 yards; diameter, 18ft.
2	" 26	70	3	1 P.		
3	" 26	...	3½	...		
4	" 26	...	3½	1 P.		
5	" 26	...	4	1½ P.		
6	" 26	...	4	1½ P.		
1	July 30	71	3	1 P.	D.	Big Lady Pit—210 yards deep, 8ft. diameter.
2	" 30	...	2½	1¼ P.		
3	" 30	...	3	1½ P.		
4	" 30	65	3	1½ P.		
5	" 30	65	5	1½ P.		
1	Oct. 17	58	2	1½ P.	E.	Big Lady Pit. Same as last.
2	" 17	58	4	1½ P.		
3	" 17	58	4	1½ P.		
4	" 17	56	2	1½ P.		
5	" 17	56	5	1½ P.		
6	" 17	...	4	1½ P.		
1	Oct. 20	Preliminary	...	...	F.	Same pit as last.
2	" 20	54	3	1½ P.		
3	" 20	54	3	1½ P.		
4	" 20	...	3	1½ P.		
5	" 20	54	5	1½ P.		
6	" 20	...	4½	2 P.		
7	" 20	54	6	1½ P.		

“Results A.—(1.) Dust was not ignited. (2.) Dust was ignited, and a violent explosion took place in the shaft; a large body of flame rushed out at the mouth of the pit, setting the woodwork on fire on the surface, and ascending into the air about 20ft. The electric firing-cable was burnt and destroyed, and the experiments had to be discontinued.

“Results B.—(1.) Dust was ignited, and the flame came out of the mouth of the shaft. The cannon was fired twenty minutes after the dust was put down. (2.) Dust was not ignited. The