accept the affirmative view than either the French or the English, founding their opinion on the behaviour of certain coal-dust from the Pluto seam.

"All the experiments carried on by the different Commissions were on a small scale as compared with those detailed in this report, and left the important question unsettled as to whether the dust explosion would follow on as it were, or traverse the whole of the workings where dry coal-dust was lodged. It was easily demonstrated that dry dust could be locally ignited. On four occasions during the experiments at the Big Lady pit the flame tavelled more than 200 yards, and only ceased when it reached the mouth of the pit, and there was an undoubted increase of violence as it travelled on its course. Some experiments were tried with roburite shots, and these failed to explode the dust; but although the experience of the experiments went to show that a large flame such as is given off by a blown-out shot of gunpowder, or a local explosion of firedamp, is required to ignite dust, yet further tests of the high explosives such as roburite seem desirable before they can be pronounced actually free from danger in the presence of dry dust."

Report of the French Commission on the Use of Explosives in the Presence of Firedamp in Mines.

The French Firedamp Commission, instituted by law of the 26th March, 1877, had expressed the wish that the Explosive Substance Commission should inquire if, by modifying the character of the method of using explosives, it was possible to diminish the effect of firedamp explosions resulting from blown-out shots. To that end M. Aguillon, who was willing to give special attention to the question, had temporarily been attached to the Explosive Substances Commission, and made known his conclusions in a report which was approved at their sitting of 2nd December, 1880.

The Commission was of opinion that, the temperature of ignition of firedamp being from 1·112° to 1·292° Fahr., there existed no explosive whose deteriorating temperature was beneath this figure. On the other hand, it was considered as almost impossible to find a process of which it could be definitely asserted that it prevented with certainty contact of the flame of the explosion with firedamp.

The English Firedamp Commission, instituted shortly after the French Commission, only terminated its researches in 1886. Their labours relative to explosive substances were directed by Sir Fredrick Abel, one of the most illustrious members.

It was ascertained that powder enclosed in a shot-hole about 2ft. deep, completely surrounded by water, when blown out, ignited four times out of six a mixture of air and firedamp.

At Sir Fredrick Abel's suggestion, powder was replaced by dynamite, compressed gun-cotton, mixed with a proportion of nitrate—saltpetre or nitrate of barium—necessary for the complete combustion of its carbon. In experiments made with blown-out shots it was ascertained that a charge of 3oz. of dynamite placed at the bottom of a shot-hole, 2ft. deep, tamped only with 6in. of sand, ignited an explosive mixture of air and firedamp. A charge of one of the high explosives above mentioned, placed at the bottom of the shot-hole and tamped by cylinders full of water—McNab process—did not ignite mixtures of air and firedamp non-explosive by themselves, but rendered inflammable by the addition of a sufficient quantity of coal-dust. Under the same conditions, and with the same mixture, powder caused ignition.

Sir Fredrick Abel had proposed in 1873 to fire explosives in the midst of water, so as to produce a perfectly equal distribution of the pressure on the sides of the hole. He considered that safety would be obtained by adopting this process. Experiments made in coal showed that though Sir Fredrick Abel's process had real economical advantages, especially in blasting the coal, it produced almost the same results as McNab's process as regards safety. Mixtures of air and firedamp rendered explosive by dust were never ignited; but out of forty-two shots with dynamite ignition of a mixture of air and firedamp occurred six times.

Mr. Galloway having proposed to place moss saturated with water immediately above the explosives, the Commission ascertained that this process—except a slight advantage in simplicity and cheapness—had nearly the same effect as water. The Commission attained no satisfactory result by the use of a rather singular process suggested by Sir F. Abel and tried by Mr. Galloway, which consisted in placing above the cartridge liquified carbonic-acid gas enclosed in iron cylinders. Furthermore, they rejected the use for stemming of solid materials capable of producing under the influence of heat a considerable amount of water or gas, such as crystallized carbonate of soda, carbonate of lime, &c. Sir F. Abel rightly remarked that there would certainly not be time, owing to the suddenness of the detonation, for the expected disengagement to be produced.

To sum up. The English Commission spoke favourably of the use of gelatine dynamite, as better resisting the action of water. The cartridge being placed at the bottom of the hole, it was recommended that water be poured in to fill the space between the sides of the cartridge and those of the hole; then to stem half the depth of the hole with moss soaked in water, and to complete the filling with water. It was remarked that this process suffices against mixtures of air and firedamp, non-explosive in themselves, but made explosive by the presence of coal-dust, but was more comparatively efficacious when the mixture of air and firedamp was actually explosive in itself. The Commission further clearly pronounced against the use of Bickford fuse, and in favour of electrical firing.

The Prussian Firedamp Commission, instituted October, 1880, have published the results of their researches from time to time. Most of their experiments on explosives were made in the course of 1885, and the results, after having been mentioned in several technical journals, were officially published in 1886. Further experiments were made under the same conditions as the earlier ones from May to September, 1887, and the results were published in the latter number of the *Official Mining Journal* for 1887.

The experiments of the Pussian Commission were made in a long artificial gallery constructed on the waste-heap at the Koinig Colliery, near Neaukirchen, Saarbruck. By means of sheets they