were able to isolate this gallery, a compartment containing about 700 cubic feet, into which firedamp from the mine was introduced to make an explosive mixture. The composition of this mixture was known by the position of the bell of the gas-holder in which the gas was enclosed. The explosive cartridges were either laid on the ground or stemmed at the bottom of the holes 1ft. 8in. to 2ft. deep, drilled in blocks of sandstone or coal 2ft. 8in. to 3ft. 4in. in length, 2ft. 4in. to 2ft. 4in. wide, and 1ft. 8in. thick. The blocks were covered by a layer of coal-dust from 8in. to 1ft. thick. The floor of the gallery was covered with coal-dust from 11 yards to 22 yards in length. The explosion of the firedamp was ascertained by observing through windows suitably placed the flame produced at each explosion.

The results obtained by the Prussian Commission have scarcely been consistent, and its conclusions have notably varied as time progressed. These contradictions, besides those inherent to the subject which have been met with, and the reasons of which will be explained further on, seem to be due to several causes, among which the principal are as follow: First, mixtures were often used too low in firedamp, and almost non-inflammable—5 to 7 per cent. of firedamp; second, there were no means of knowing for a certainty that the explosion had been fired effectually. It will be seen later that this condition is the most important of all to be known.

But, be that as it may, the principal results at which the Commission progressively arrived are as follows:—

Dynamite, which until June, 1885, had, exploding unconfined, only once ignited firedamp almost invariably ignited it in the experiments of July in the same year. The Commission attributed this change to the substitution of dry dynamite—that is to say, one in which the nitro-glycerine is thoroughly absorbed by silica for a wet dynamite, from which the nitro-glycerine had some tendency to exude.

Blasting-gelatine in 1885 had, exploded unconfined, never ignited firedamp, and had only kindled it once, when lightly stemmed at the bottom of a shot-hole with a gaseous mixture containing 9 per cent. of firedamp. In 1887 ignition was effected by unconfined explosion. On the other hand, even with heavy charges—9·88oz.—a mixture of 10 per cent. of firedamp was not ignited when the cartridge was stemmed in shot-holes drilled in blocks of sandstone.

Gelatine Dynamite No. 1 did not ignite firedamp in 1885; in 1887 it ignited firedamp and coal-dust, exploding unconfined; but a charge of 10·58oz. stemmed at the bottom of a shot-hole, did not ignite a 10-per-cent. mixture of firedamp, although, under the same conditions, an 8·11 oz. charge of powder caused ignition.

Gelatine Dynamite No. 3, which is exploded with difficulty, exploded unconfined, ignited firedamp in 1885 and 1887.

Compressed Gun-cotton did not ignite firedamp on detonation, either unconfined or stemmed at the bottom of a hole, either in 1885 or in 1887.

Hellhoffite did not ignite fire-damp in 1885, either exploding unconfined or stemmed at the bottom of a shot-hole. The experiments were not repeated in 1887.

Gun-cotton, mixed with 50 per cent. of nitrate of barium, untried in 1885, had, exploding unconfined, ignited firedamp in 1887.

Carbonite consists of saltpetre-cellulose and a mixture of nitro-glycerine, with a peculiar sulphurous oil, sulphureted benzol. The inventors have introduced two varieties of this substance. No. 1 ignited coal-dust alone; No. 2 proved thoroughly safe in forty-two experiments made with 3·53oz. cartridges, fired amongst mixtures containing up to 9 per cent. of firedamp. It was then used on a large scale in the Koinig Colliery for driving three drifts to the coal of the gassy Carlowitz Pit. Explosions occurred five times in a very feeble explosive mixture of firedamp and dust. The presence of the firedamp was barely shown on the benzine lamp, and there was a little coal-dust. In four out of these five cases the shots worked well; in the fifth the shot was blown out, which appears to be not uncommon with carbonite, securite, and roburite. Four of the charges were from 4 to 4½—3·53oz.—cartridges; for the blown-out shot and for another of the five shots the charge was only from 2oz. to 2½oz. cartridges. Although four successful shots only caused local explosions, the blown-out shot ignited coal in place.

Further tests were then made in the experimental gallery, and, with 14·11oz. of carbonite, coal-dust was ignited twice out of five times. It should be added that the lower power of the explosive, which otherwise gave it in working coal a superiority over other blasting explosions, did not permit the employment of small charges in a mine.

Kinetite, a complete composition, containing chlorate of potash, did not ignite gas. The presence of chlorate of potash makes this substance too dangerous for its use to be recommended.

Securite, consisting of dinitro-benzol and nitrate of ammonium in various proportions, with nitrated resin, and traces of naphthaline and nitrate of soda, two different mixtures, have given safe enough results in April and May, 1887; but in August in the same year a 3·53oz. cartridge suspended in 10-per-cent. mixture of firedamp produced explosion twice out of thrice.

Roburite consists of a chlorinated nitrated hydrocarbon and nitrate of ammonium, in various proportions: (1.) Roburite of the old composition, containing piric acid, ignited gas when the cartridge was inclined at 40 degrees. (2.) Torpedo-roburite ignited the mixture containing 5 per cent. of firedamp. (3.) Mine-roburite I., dinitro-chloro-benzol and nitrate of ammonium, without piric acid, ignited once. (4.) Mine-roburite II., similar to the last, but containing phenol besides, did not cause ignition even when the cartridge was inclined at 40 degrees.

Lithotrite, from Demense, Aix-la-Chapelle, caused an ignition.

Schultz-powder, from Messrs. Voltz, Lichtenberg, and Company, of Ludwigshafen, did not prove itself safe in a finely-divided state. The powder slightly compressed caused ignition with 8 per cent. of firedamp. The powder strongly compressed never caused ignition.

The Bornhardt 15-grain detonators did not cause ignition even with 8 per cent. of firedamp.

Mr. Hugo Lohmann, after having given—in the Zeitschr. für Berg-Hutton-und-Salinen Wessen