

**NEW METHODS OF
TESTING
EXPLOSIVES**

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New methods of testing explosives by Axel Larsen

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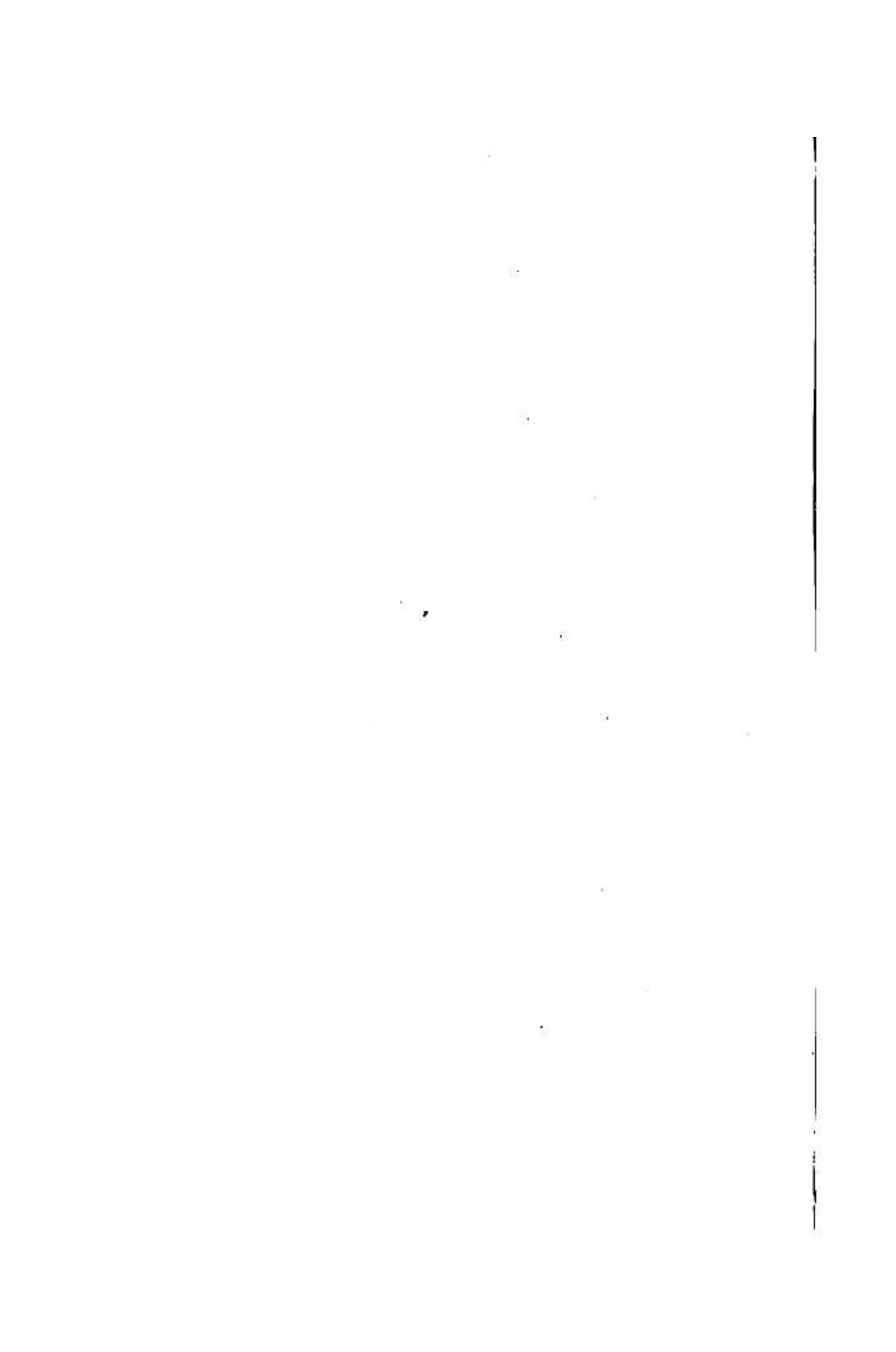
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NEW METHODS OF TESTING EXPLOSIVES

INTRODUCTORY

"In every department of serious inquiry men are glad to find the same conclusions reached by different methods—the more different the better. Of course, it is obvious that if one started from absolutely certain premises or data, and could exclude all fallacies in the process of making logical inferences from them, then the conclusions would need no support. Certain data and certain logic must yield certain conclusions. Not in one in ten thousand of his inquiries can the man of science command these desirable conditions; and so he ever seeks to reach by more methods than one that which, he hopes, is a valid conclusion."—*Scientific Notes*, *PALL MALL GAZETTE*.

UNTIL about fifteen years ago black powder and dynamite were almost the only explosives used in practical mining. The danger entailed by their use in workings where gas was met with, had, however, been generally recognised, and the admitted expediency of abolishing their employment in "fiery" mines or seams presently brought about a material change of affairs.

To-day, the use of gunpowder has almost entirely ceased in collieries troubled with gas, and even in quarries it has been largely abandoned. Dynamite has perhaps stood its ground rather better, but this material, too, has had to yield wherever pit-gas or dangerous quantities of coal-dust abounded, both in fact being almost universally superseded nowadays by so-called "safety" explosives.

As long as there were only two kinds of explosives,

2 NEW METHODS OF TESTING EXPLOSIVES

their selection appears to have involved but scant embarrassment. Thus, for getting soft coal or for obtaining large blocks in rock-blasting, gunpowder was the material chosen. If, on the other hand, the coal was too hard or the cost of boring too high to permit the use of powder, the stronger explosive, dynamite, was resorted to. But since the risk of shot-firing in fiery or dusty mines was fully recognised an entirely new factor became a desideratum, that, namely, of rendering the operation safe.

The higher demands thus made on the inventive skill of manufacturers resulted in the closer study of the essential properties of explosives and the phenomena of their decomposition, and the name of Mr. C. E. Bichel (inventor of "Carbonite" and Managing Director of the Carbonite Explosives Company Limited, Hamburg) stands prominent amongst the pioneers in this movement. By his recent achievements in practical research and his initiative in devising entirely new methods and apparatus for throwing light on the causes of ignition of firedamp by explosives, he has added to our technical knowledge of these substances a chapter of extreme interest and incontestable value.

In the present account of Mr. Bichel's investigations, published for the first time in England, the writer has adhered throughout to the original serial reports save such re-editing of the material as was found expedient in order to furnish a complete presentment.

Due credit is given by Mr. Bichel to Drs. Mettegang, Schmidt, and Rudeloff (superintendent chemists at his works) for their services in connection with the researches hereinafter described, a special tribute being paid to Dr. Mettegang to whom the task of designing the apparatus and of conducting the experimental work was particularly entrusted.



HISTORICAL

At the Carbonite Works at Schlebusch the following questions were made the subject of practical research :

1. *Why does a smaller quantity of one explosive than of another cause ignition of firedamp?*
2. *What are the incidental phenomena and the influences tending to promote such result?*
and
3. *In what manner do they co-operate in producing it?*

In order to solve these problems several types of special apparatus were devised and built and a series of experiments, extending over the last eight years, carried out. At the outset it was decided to forego the more purely theoretical treatment of the subject which had been inaugurated by earlier (French) investigators, in regard to the question of safety in presence of firedamp, and to follow almost exclusively the experimental method. In treating the matter theoretically one is obliged to make certain assumptions and to apply laws the correctness of which, under abnormal pressures and temperatures, has not been universally accepted. Apart from this, the theoretical method did not commend itself, for the reason that the manufacturers' object was to apply the practical knowledge experimentally gained, to the production of new and manifestly better explosive compounds.