

Modern Mining Explosives.

DR. WILLIAM CULLEN, who took the presidency of the Institution of Mining and Metallurgy on Oct. 17 last, chose for his presidential address the subject of mining explosives, this being one with which the greater part of his life's work has been identified. The address, therefore, constitutes an exceedingly valuable summary of the present position of the explosives industry; it is so rich in material that it is practically impossible to give an abstract of it which will do anything like justice to the large amount of matter it represents, there being practically no aspect of explosives with which Dr. Cullen has not dealt.

Necessarily, Dr. Cullen devotes considerable attention to the use of nitro-glycerine and its products, which are used more extensively than any other mining explosive throughout the world to-day. He points out the dangers attending the handling of explosives in which the nitro-glycerine is frozen, and explains how of recent years this difficulty has been got over, there being two methods in use to-day. In one the glycerine before nitration is polymerised; the nitrated polymerised glycerine acts like ordinary nitro-glycerine in all respects except that it does not freeze. The second method consists in replacing nitro-glycerine by dinitroglycol, which again behaves in all respects like nitro-glycerine except that it is not liable to freeze in winter. Explosives in which one or other of these products replaces nitro-glycerine to a sufficient extent to prevent freezing are generally spoken of as low freezing explosives and are used in all circumstances where ordinary nitro-glycerine explosives might be liable to freeze.

Dr. Cullen deals briefly with liquid oxygen explosives, but would scarcely appear to do them justice; they are used extensively in some parts of the Continent and are also used in open-cast work in Great Britain, as Dr. Cullen indicates; he states, however, that their use is attended with an economy of about 10 per cent, whereas some of the most recent authoritative statements on the subject show an economy of 30-50 per cent.

As an all-round explosive, Dr. Cullen appears to favour explosives consisting essentially of nitrate of ammonia with a certain definite proportion of nitro-

glycerine. He points out, however, that in coal mining special types of explosives must be employed because of the danger of initiating explosions of fire-damp or coal dust. It has long been known that gunpowder, for example, is exceedingly dangerous in this respect both because it gives a fairly hot flame and also because the flame is one of long duration. The latter consideration is a very important one, and in connexion with this matter Dr. Cullen points out that the ordinary mercury fulminate detonator seems to be incapable of igniting firedamp, whereas the more modern tetral detonator with lead azide primer contained in an aluminium tube will always explode a mixture of firedamp and air.

Dr. Cullen is a keen advocate for the simplification of the explosives industry; for example, he points out that there are at the moment no less than 71 explosives on the British 'permitted' list, whereas probably a dozen would be sufficient, and that standardisation is here clearly indicated as a means of lowering the cost of such explosives without in any way diminishing their efficiency or safety.

It may perhaps be of interest to add that Dr. Cullen's address concludes with a reference to the interchange of technical information concerning explosives that is in existence between Great Britain and the United States of America, and in this connexion he refers to the recent award of the medal of the Institution of Mining Engineers to Mr. George S. Rice, Chief Mining Engineer of the U.S. Bureau of Mines. He points out that with European countries relations are cordial but are not so accurately defined as they are with the United States. It is surely not too much to hope that before very long the question of safety in mines, in which a proper understanding of mining explosives must always play a leading part, will be looked upon and treated as an international question, and that definite arrangements will be made with all countries in which the mining industry occupies a prominent position to pool all information tending to safety, thus avoiding needless duplication of effort and expenditure and directing research along the lines where it will produce the maximum degree of usefulness to mankind.

Low Temperature Carbonisation in Power Station Practice.

THE Institution of Electrical Engineers arranged a discussion on Nov. 21 on the low temperature carbonisation of fuel in combination with the generation of electricity. Prof. P. Rosin dealt with German practice, S. McEwen with American, and E. H. Smythe and E. G. Weekes with English practice. As all these speakers have had ample opportunity of familiarising themselves with the problem, their opinions deserve close attention.

Prof. Rosin says that in Germany the original aim of carbonising bituminous coal for the sake of the tar and oil has met with disillusionment, and the principal object is now the production of a smokeless domestic fuel from fine coal slacks, while the utilisation of the gas receives increasing attention. Indeed, the only large low temperature plant working economically on coal is the K.S.G. plant at Karnap—a unit of which is now installed at a London gasworks.

In power station practice the size of the coke product is unimportant, the available boiler plant being capable of consuming anything from dust to lumps. No value can therefore be assigned to the coke in excess of that of cheap low-grade boiler slacks—the cheapest grade of coal. It is therefore much

more difficult to couple precarbonisation of coal with power production than to make economical domestic fuel, which commands the highest price in the market. The capital costs must be very low and the yields of tar and gas high. In Germany, Rosin says these conditions cannot be realised, and "low temperature plants using pit coal . . . offer no prospect of remunerative operation at present". With brown coal the position is different because the raw material, got without mining, is very cheap and the tar more valuable than the coal. Much of this tar is now being converted into motor spirit, 200,000 tons of which will be made this year. Nevertheless, the by-products are regarded as an unstable item of revenue, and the revenue from the sale of electricity should be regarded as the basis of any successful enterprise.

S. McEwen, speaking of American experience, voiced similar views on the economics of power station carbonisation. Owing to the low value of the coke for steam raising, it is essential to reduce the capital and labour costs to a minimum. It was with this idea in view that the process of carbonising coal dust while falling through a vertical retort was developed by McEwen and Runge. The product