Liquid Air Explosives.

AN Order in Council (1921, No. 1194) has been issued exempting explosives made by impregnating absorbent carbonaceous material with liquid air or oxygen from that provision of the Explosives Act which requires the manufacture of explosives to be carried out in licensed premises. This Order will, therefore, enable free competition between explosives of the usual type and mixtures of liquid oxygen with a fuel that can be made on the spot shortly before firing.

Liquid oxygen explosives originated in Germany, but before the war had no great vogue. During the war they were used on a fairly large scale by the Germans in non-gaseous coal mines, in iron mines, and for the destruction of machinery in French steel plants. This development was occasioned by the need for conserving Germany's supply of nitrates for the manufacture of military explosives.

The increasing cost of explosives and the improved methods of obtaining liquid oxygen make the problem of producing explosives by the simple method of saturating materials like wood-meal with liquid oxygen an attractive one. The explosives so produced also present certain advantages, especially as regards freedom from danger in transport, storage, and handling, but they have certain inherent disadvantages: thus, the rapid evaporation of the liquid oxygen necessitates rapid firing and so limits the number of shots that can be fired in one blast; it is necessary to have a liquefying plant close at hand; and the explosive cannot be used in fiery mines.

The plant required for liquefaction must be capable of turning out a product containing at least 85 per cent. of liquid oxygen. This is conveyed in Dewar vessels to the proximity of the rock face, where it is poured over a paper cartridge containing carbonaceous matter of different kinds, such as carbonised cork, or wood-meal, with or without the addition of petroleum. The impregnation of this cartridge with the liquid oxygen is carried out in a cylindrical vacuum-jacketed vessel, care being taken that the impregnated cartridge contains sufficient oxygen to ensure the total combustion of the carbonaceous filling and of its paper envelope. The impregnated cartridges are then pushed into the bore hole, where they are detonated by means of the usual detonator, or in some cases simply by a gunpowder fuze. According to another method the cartridges are impregnated in the bore-hole itself. The violence of this explosive is comparable with that of the more intense blasting agents, but much depends upon the manipulative skill of the workers.

For industrial purposes, since the war, there has been a general reversion to explosives based on nitrates, but it is understood that liquid air explosives are still used in Germany to a limited extent, and that experiments are being made with them in certain French Departments. Their investigation is also being carried on by the United States Bureau of Mines, which has issued a preliminary bulletin on the subject.

Obituary.

Prof. F. A. Bainbridge, F.R.S.

PROF. FRANCIS ARTHUR BAINBRIDGE passed away on October 27. His friends knew he was not well enough to carry on his usual busy life of teaching and research, but none foresaw that his life would be suddenly cut short by heart failure. He was only forty-seven years old and in the prime of his career. Our deep sympathy goes out to his widow and little daughter.

Prof. Bainbridge had for years been a man of poor physique, and it was a wonder to his friends how, in spite of frequent attacks of illness, he contrived to do so much useful work. He was modest and retiring, but his catholic interest in scientific work and in things in general made him a delightful and lovable companion. He was a skilful experimenter, a clear writer, and an excellent teacher. Such men we can ill spare. The book ("Essentials of Physiology") he wrote with the late Prof. Menzies is highly esteemed, and illustrates to the full the power he had of interesting his readers and of making crooked paths straight.

Prof. Bainbridge was born at Stockton-on-Tees, educated at the Leys School, and then at Trinity College, Cambridge. His medical studies were carried out at St. Bartholomew's, and after a brilliant academic career he filled several minor posts in that hospital. His early researches were carried out at University College. Among the positions he held were British Medical Research Scholar, demonstrator in pharmacology at St. Bartholomew's, Gordon lecturer on pathology at Guy's, Jenner Memorial student and assistant bacteriologist at the Lister Institute, later the professorship of physiology at Newcastle (1911), and finally, 1915, he returned to his old school, St. Bartholomew's, as university professor of physiology. At the outbreak of war he at once offered his services, received a temporary commission in the R.A.M.C., and had charge of a military hospital at Newcastle; he worked also on the action of poison gases at Millbank, and gave lectures on that subject in cadet training schools throughout the country; but the stress of work was too great, and his health broke down, so that he had to resign his commission. His devotion to duty of all kinds made him an