MINERAL INDUSTRY OF CANADA.

THE Canadian Department of Mines has issued, almost simultaneously, the annual report on the mineral production of Canada during the calendar year 1913 and the preliminary report on the mineral production of Canada during the calendar year 1914. Neither of these reports presents any feature of outstanding interest, except that the effect of the war upon the mineral industry of Canada is here made evident. The value of the output in 1913 showed an increase of 7·84 per cent. upon that of the previous year, whilst that for 1914 shows a decrease of 11·8 per cent. from that of 1913. It is, of course, not absolutely clear that the decrease is wholly due to the war. For example, the silver production of Canada, which showed a slight decrease already in the former year, has fallen about 16 per cent. in the latter year; the silver production is due in very great measure to the output of the Cobalt district, Ontario; in 1904, when the production of this district commenced, the annual production of silver was 3½ million ounces, whereas in 1910, when it reached its maximum, it was nearly thirty-three million ounces, and silver ranks second in total value only to coal amongst the mineral products of Canada, having amounted to 14·4 per cent. of that total in 1913. Both the amount of silver and the grade of the ore got in the Cobalt district have shown a gradual decline of recent years, and there appear to be some reasons to suppose that the life of the mines in this district is not likely to be a long one. A decrease in silver production might therefore have been expected normally, and it is quite possible that the part played by the European war in the recorded decrease is not an important one. Other decreases, such as those in coal, pig-iron, cement, and clay products, are, on the other hand, to be referred in all probability entirely to the war crisis. The three former showed substantial increases in 1913 over the previous year, and although the clay products fell off in value in that year, this was due merely to a temporarily decreased demand for brick, owing to the unfavourable financial position, which seriously limited building operations in the Dominion. A careful study of the two reports indicates no ground for supposing that the mineral industry of Canada is in other than a thoroughly sound condition, or that its expansion in the future will be unable to keep pace with any demands that may be made upon it.

EXPLOSIVES.

THE Smithsonian Institution, Washington, has recently issued an article by Major Edward P. O'Hern, of the Ordnance Department, U.S. Army, which deals with the composition, methods of employment, and results obtained with explosives.

The author divides explosives into three classes: progressive or propelling explosives, known as low explosives; detonating explosives or high explosives; and detonators or fulminates. For all classes the effect of the explosion is dependent upon the quantity of gas and heat developed per unit of weight and volume of the explosive, the rapidity of the reaction, and the character of the confinement, if any, given the explosive charge. The rapidity of reaction varies greatly with different explosive substances and with the manner in which the explosion is started.

Black gunpowder, smokeless powder, and black blasting powders are known as low explosives, for certain of which, such as smokeless powder, the explosion does not differ in principle from the burning of a piece of wood or other combustible. The combustion is very rapid, but is a surface action proceeding from layer to layer until the grain is consumed. Such materials are known as low or progressive explosives, although the total power developed through the combustion of a unit weight may be very great, and would be destructive unless properly controlled.

In high explosives, such as dynamite, nitroglycerin, gun-cotton, some blasting powders, and most of the "permissible explosives" approved by the U.S. Bureau of Mines for use in mines where gas explosions are liable to occur, the progress of the explosive reaction is not by burning from layer to layer, but the breaking up of the initial molecules gives rise to an explosive wave which is transmitted with great velocity in all directions throughout the mass, and causes its almost instantaneous conversion into gas. The velocity of propagation of the detonating wave has been determined for some materials to be more than 20,000 ft. per second, or approximately four miles per second; this form of material is used in shells and for bursting purposes. The progressive emission of a gas from a low explosive, such as burning gunpowder, produces a pushing effect upon a projectile, whereas the sudden conversion of an equal weight of material into gas, as would happen with a high explosive such as dynamite or nitroglycerin, would develop such high pressure and shattering effect as to rupture the gun.

The action of fulminates is much more brusque and powerful than that of the high explosives. Since they can be detonated by shock or the application of heat, they are used in primers and fuses to start action in both low and high explosives. The most important is fulminate of mercury, which produces a pressure of about 48,000 atmospheres.

At no time in the history of the world have explosives played such an important part in deciding the destiny of nations as they are playing to-day in the prosecution of the present war. Their extensive use in the mighty engines of destruction, such as the submarine mine, the torpedo, and in projectiles thrown from cannon to great distances with marvellous accuracy, is resulting in loss of life and destruction of property on an unprecedented scale.

Beginning with black powder, the earliest record of which in actual war was in the fourteenth century, the author follows the development of powder through its early stages of brown powder to the two principal forms of smokeless powder for military purposes—nitro-cellulose and nitro-glycerin—stating that the use is quite evenly divided; the U.S. Army and Navy, the French Army and Navy, and the Germany Army using the former, and the British Army and Navy and the German Navy using the latter. He then gives much detailed information concerning the manufacture, life, source of supply, and tests of smokeless powder manufactured from nitro-cellulose or gun-cotton. Following which, subjects relating to life of guns, bursting charges for projectiles, armour-piercing projectiles, high explosive shells, shrapnel, fuses, aeroplane bombs, means of igniting explosives, mines, torpedoes, and the storage and shipment of explosives in the United States are discussed.

THE BONAPARTE FUND FOR THE YEAR 1915.

THE committee appointed to consider the requests for assistance from this fund have examined twenty applications, and made the following proposals, which were accepted by the Academy:—

3000 francs to Auguste Lameere, professor at the University of Brussels, to assist him to continue his researches at the zoological station of Roscoff.

4000 francs to M. Le Morvan, assistant astronomer