much to say, because the directions which might be given in regard to the care to be taken with the wires are purely of an electrical nature, and would apply with equal force to almost every class of electrical circuit. Needless, therefore, to say, the ends of the wires proceeding from the electrical fuse to the exterior of the borehole must be carefully cleaned and scraped before being twisted with the wires leading away to the firing-point. Also care must be taken that the exposed portion of the wire on the two circuits are kept away from one another, either by binding them round with insulating tape, or by keeping them hanging in the air out of contact with damp earth or any other possible source of leakage.

"The arrangement of the circuits when a number of charges are being fired together is a very important matter, though simple rules are laid down in regard to it, which makes the operation easy enough. We are referring to the question as to whether the wires from the different boreholes are to be connected in series or in parallel. The electrical term 'in series' refers to that arrangement of the wires which would cause the main current to pass through one fuse, then through the next, and then through the third, in the manner of a chain, so that the same current passes through them all. The term 'parallel' refers to the arrangement by which the current is split up into a number of branches. In practice the series system of connecting is generally used.

"*Exploders.*—The next question requiring consideration is the source of the electric current which is conducted along the wires to the fuse. The number of ways of obtaining the current are perplexingly numerous. Perhaps the simplest in those cases where the mine itself is lighted electrically is to take off connections from the main electric-light current; and with proper precautions this system works as well as any. It is, however, exposed to certain dangers which have to be fully guarded against. They lie mainly in the fact that any exposed wires in the blasting circuit which may by any chance be touching the earth are, under these conditions, liable to produce much more serious results, since a corresponding leakage on a main in the electric-light circuit may produce complications. The nearest allied method to taking the electric current from the electric-lighting circuit is to derive it from accumulators which are charged from the lighting circuits from time to time. There are several forms of strong and powerful batteries which are at the same time sufficiently portable to be used for this purpose, and the reliability of their action when kept in good working-order is a strong recommendation in their favour.

"In the bulk of the cases, however, the facilities for the electric-light installation do not exist, and it is necessary to fall back upon a system where the electricity required for blasting purposes is generated on the spot. The most obvious of the methods within this category is perhaps that of primary batteries, which consist of a certain number of cells of such size and arrangement as to produce the required current. A disadvantage of this system is that there is no form of primary battery which is capable of doing heavy work, such as is required for blasting purposes, with certainty and economy. Furthermore, a battery of this character requires a considerable amount of attention, and has to be kept in the very best condition if its efficiency is to be maintained. Again, its bulk and weight are in the way of carrying it about, and make it all the more liable to go wrong in the rough treatment which it of necessity must receive in a mine.

"The most practical plan, therefore, is to be found in the apparatus known as the 'magneto exploder.' These machines consist of a dynamo, such as is used for electric-light purposes, on a small scale, and arranged to be turned by hand; in fact, the only difference between it and a dynamo in the principle of its construction lies in the fact that what are known as the 'field magnets' are made of a piece of magnetized steel, representing a horse-shoe magnet on a large scale; whereas in the electric-lighting dynamos the magnetic field is produced by coils of wire passed around a soft-iron magnet, and supplied with electricity from the machine itself. It is astonishing what powerful currents can be obtained from these little machines by a few rapid turns of the handle—so much so, in fact, that the labour involved in working them is immaterial by the side of the many conveniences which accrue from their portability and their general solidity of construction, which prevents them from getting out of order."

I have, &c.,
JOHN HAYES,
Inspecting Engineer.

No. 2.

Mr. J. COUTTS, Inspector of Mines, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Inspector of Mines' Office, Thames, 31st January, 1901.

I have the honour to transmit to the Hon. the Minister of Mines the following report on the coal-mines in the Auckland District for the year ended 31st December, 1900, in compliance with section 67 of "The Coal-mines Act, 1891" :—

KAWAKAWA.

Kawakawa Mine.—The operations in this mine are now being carried on by Mr. John Culley, who has a permit to manage the mine in accordance with section 21 of "The Coal-mines Act, 1891." The work is still confined to taking out pillars on Moody's Outcrop, and, as the seam does not exceed 4 ft. thick where it is at present being worked, the quantity of coal broken out by the five men employed in the mine is therefore only limited. The output of coal for the year ended the 31st December was 3,649 tons. Last time the mine was inspected the workings were safe, the ventilation good, and the Act complied with.