

gested by the earlier committee. It was pointed out that although the accidents and ignitions arising from electrical causes were on the increase, yet, having regard to the great increase in electrical plant, the risks attending the use of electrical plant in mines were decreasing, and in no year had the fatal accidents due to electricity been greater than 1.54 per cent. of the total fatal accidents. The risks associated with the use of electricity may be classified as due to either shock or ignition. There are two ways of attacking the shock problem. One is that of employing such a low pressure that the shock would seldom be dangerous and the other is that of employing only properly protected apparatus. The view in this country is that for all fixed plant the latter is the better and indeed the only really safe method. For portable plant complete protection should be aimed at, but having regard to the inherent difficulties in the way of totally preventing contact with live parts, it is advisable to adopt a low pressure as a further safeguard. In the case of fixed plant adequately protected, the question arises as to whether any limits should be set to the pressure under which it should work. Many think that there should be a limit, and a fairly low limit, and ten or even five years ago there was considerable justification for such a view, for at that time high tension cables and apparatus had not been as thoroughly developed as they have been since, and moreover not much attention was then paid to the special requirements of colliery electrical apparatus.

The above mentioned second committee in its report stated very definitely that it saw no reason why a high-pressure system should not be as safe as regards risk of shock and explosion as a medium or low pressure system. The adoption of higher pressures is moreover accompanied by some substantial benefits. A high pressure cable is thinner and lighter and more easily handled and supported than a low pressure cable of the same power, and it is generally of the highest class of construction, and provided with extra thick insulation.

The safe use of high-pressure apparatus turns upon the provision of complete protection. The only satisfactory protective system is the elementary but effective one of encasing all live parts in a substantial metallic sheath or box maintained at earth potential. A good deal of discussion has lately taken place as to the advisability or otherwise of earthing all apparatus. There are difficulties. In dry mines, particularly, good earths are often difficult to obtain, and two earth plates some distance apart may even be at appreciably different potentials until connected. If a difference of potential is maintained it will, of course, lead to the flow of current in the protective armouring, which may have objectionable results. On the other hand the risks of a difference of potential being maintained are small, except possibly in very deep or extensive mines. Armouring may be local or continuous, but the latter is much safer. Indeed, if the armouring is discontinuous a section of the armouring may, in the case of a faulty earth, become dangerously charged. To maintain armouring in continuous conditions involves systematic inspection. It is held that all electrical plant should be systematically inspected, and the absence of competent inspectors should not be admitted as an excuse.

The report insisted strongly upon the need for having all the electrical plant properly looked after, as well as thoroughly well made in the first instance. There is no doubt that competition, which has been more than usually keen in the electrical industry, had in some instances reduced strengths and proportions below a proper limit, but a considerable improvement is taking place, and the report strongly disapproved of the suggestion that the Home Office should officially approve of certain types of mining electrical apparatus. In this most engineers, if not all colliery managers, will agree with them, for official approval would certainly tend to hamper progress, which is particularly needed in the early stages of the mining electrical industry. The quality of workmanship and materials are as important as design or type; official approval could only be a partial guarantee, and would tend to relieve the colliery manager of his proper responsibility for the safety of his mining equipment.

A very interesting winding engine plant operated electrically has just been put in an important Durham colliery. The depth of the shaft is 162 feet, the time of each wind 15 seconds, the average winding speed 648 feet per minute, and the time allowed for changing 10 seconds. The winding gear is fitted with a coned drum, varying from 5 feet 6 inches to 7 feet 6 inches in diameter. The 100 b.h.p. motor is of the three-phase type, 440 volts, 40 cycles, and drives on the drum shaft through a flexible coupling and a train of machine cut helical gearing. The winder is fitted with automatic winding gear, which, in the event of an overwind, trips the main switch and cuts off the supply to the motor, and also applies the main post brakes. This gear also comes into operation in the event of failure of the supply, and is further fitted with an emergency lever, by which it may be brought into operation by hand.

The switch gear consists of an iron-clad column fitted with a three-pole oil switch with overload and no-voltage release, and an isolating switch is provided, interlocked with the main switch and the various doors of the switch column. The controller is of the rising liquid type, the control being carried out by means of one lever, which is "off" in the central position. A small centrifugal pump and motor are provided on the controller, the pump constantly delivering water from a storage tank contained in the controller bed-plate to the tank containing the electrodes. This tank is fitted with a rising and falling shutter, which is operated from the control lever, and regulates the level of the liquid in the tank. The reversing switches are mounted upon the shaft that operates the controller, and one switch is provided for each running direction. The switches are worked by means of a link motion from the control lever.

South African mines in London, although at times showing a desire to spurt, are now again completely out of favour. Yet the industry is not doing badly, although there is the usual falling off in the supply of native labour which is to be expected at this time of the year. The gold output keeps growing. Last March the record, which, owing to exceptional circumstances, had stood since December, 1908, was at last broken. In April the daily average yield was again a record,