

regarding clear water they are fairly satisfactory at low heads, but not so efficiently as the plunger, or as reliable as the Cornish types. When, however, the water is gritty, they were universally condemned. When steam-power is used the opinion was unanimously in favour of the old Cornish lift-and-plunger pump, which bears out the New Zealand practice at Waihi and the Thames. I could not discover one instance of the centrifugal pump having been used for sinking purposes; the bare suggestion was received with condemnation. Judging from the report of H.M. Inspector of Mines for Cornwall, the results obtained in that county were not much better than they have been in Victoria.* The number of disused centrifugal pumps I saw in Victoria was startling evidence of their inefficiency in alluvial gold-mines.

In the State of New South Wales electric-generating plants have been installed at thirty-three collieries, the total capacity in electrical output amounting to 2,176 KW, equivalent to 2,917-horse power; the motor-driven machinery is divided as follows:—

16 collieries have	...	...	...	62 coal-cutters.
6 "	...	...	...	8 haulage equipments.
19 "	...	...	...	33 pumps
6 "	...	...	...	10 ventilating-fans.
5 "	...	...	...	7 motors applied to other uses.

There are, in addition, 1,482 electric lamps on the surface and 777 below ground.

The plants of twenty-five mines come under the category of low pressure (*i.e.*, 250 volts and under); seven are classed as medium pressure (*i.e.*, 250 to 650 volts); and only one—*viz.*, South Bulli Colliery—ranks as high pressure (*i.e.*, 650 to 3,000 volts).† All are direct current except the last, by which a three-phase alternate current is used; and of the collieries I visited the South Bulli installation appeared to be the most modern and extensive, and, notwithstanding the high voltage, was under complete and safe control, no accidents having been experienced therefrom.

There are, admittedly, risks connected with the use of electricity. Recent authoritative statistics show that during the last two years the deaths from electric shock in the mines of Great Britain totalled thirty-seven, of which number fourteen persons were on the electrical staff, as against twenty-two employees in the mines, who inadvertently came in contact with "live" wires or fittings or structural work that had become "alive" accidentally. In New South Wales one life has been lost by shock owing to contact with a bare wire in the Central Mine at Broken Hill; and in Victoria a man was killed at Rutherglen by coming in contact with a bare wire used for electric traction below ground at the low voltage of 240.

In this Dominion no lives have hitherto been lost at the only two mines at Allandale and Waihi using electric motive power, but several lives have been lost owing to electric shocks received from tramway and other wires not connected with mines.

For the protection of human life special rules were recently adopted as the result of a Committee of Inquiry appointed by the Secretary for Mines of New South Wales; these regulations are based upon those established for some years in Great Britain; and in view of the further and increasing application of electrical power in the mines of this Dominion the adoption of similar regulations appears to be very desirable, for in the event of installations being erected before such regulations appear the mine-owners may feel reluctant to alter the same, as the result of subsequently established ordinances.

In conclusion, I beg to acknowledge the great assistance rendered to me in New South Wales by the Chief Inspector of Collieries, Mr. A. A. Atkinson, who accompanied me on some of my inspections, and was ever ready to render my visit a successful one. I am also greatly indebted to the following gentlemen for their assistance and advice: Mr. J. B. Jacquet, A.R. S.M., Chief Inspector, Metalliferous Mines, New South Wales; Inspector W. Humble, F.G.S., Newcastle, New South Wales; Mr. A. H. Merrin, M.C.E., Chief Inspector of Mines, Victoria; Captain Abraham, Inspector of Mines, Victoria; also to the Under-Secretaries of Mines of Victoria and New South Wales.

I have, &c.,

FRANK REED,

The Under-Secretary for Mines, Wellington.

Inspecting Engineer of Mines.

* Extract from the report of Mr. J. S. Martin, H.M. Inspector of Mines in Cornwall, &c., for the year 1907.—"The experience generally in Cornwall up to the present with electricity, more especially in its application to centrifugal pumps, has not been successful, due to a muddle, as I understand, between electrical and mechanical engines. At Tywarwhalle, the results attained to a depth of about forty fathoms below adit with both the gas-producer, electrical plant, and centrifugal pump, have been quite up to anticipation, but at Great Dowgas, Hingston Downs, Wheal Bury, and Wheal Vor, centrifugal pumping has so far not been satisfactory, and the failure has been attributed to different causes, insufficient power among others." † Extract from the Report of the New South Wales Committee of Inquiry into the use of Electricity in Coal-mines, 1908.