This would be about 140 miles long. By another route *via* Shag Valley the distance to Palmerston South would be about 110 miles, and from this point the distance to Dunedin would be about thirty eight miles, and to Oamaru, thirty-seven miles, making the total distance to Dunedin and Oamaru, say, 148 miles each. Power would be taken from a line at many intermediate points, and no doubt some branch-lines would be required. These have not been taken account of in the estimates given. Also there would be main lines following different routes with so much power to transmit.

Hawea is an excellent source of power. The only defect is the length of transmission-line required to reach the, at present, most populous districts. It has been found to be better in every respect than I anticipated in my first forecast to you of its value. The fall between the lakes is found to be greater by 27 ft. than is shown on the survey maps, and the quantity of water available is much greater than I thought it would be.

The Clutha was gauged just below the junction of the Hawea River at the punt-crossing. The observed flow was 23,540 cubic feet per second, but the river was in partial flood. The ordinary summer flow would be, as deduced from the summer level given, about 18,700 cubic feet per second, and the low-water flow about 9,000 cubic feet per second. These actual results seem to be higher and lower than the corresponding results for Wakatipu. They are, however, only approximate. Higher results might be expected from the Wanaka because of the relatively great glacier-area in the watershed.

Lake Wakatipu.

Many suggestions have been made as to utilising the Kawarau rapids at the outlet of this lake. Accurate levels of the relative height of the rapids and the flood-level of the Shotover River show conclusively that any such scheme is impracticable, as the flood-water from the Shotover backs up to nearly the level of the rapids. At the time the levels were taken there was only 2½ ft. of fall from the rapids to the Shotover junction.

No scheme for utilising Wakatipu by a dam at the lake-outlet would now be admissible. All settlements round the lake would be destroyed, except, perhaps, the higher parts of Queenstown.

The flow in the Kawarau was gauged and found to be 12,400 cubic feet per second. The lake ordinarily has a variation in level of about 5½ ft. A daily record of the lake-level for a continuous period of 800 days was obtained from the Postmaster at Queenstown, from which the probable mean flow of the Kawarau for this period was computed, and found to be just over 11,000 cubic feet per second; the actual discharge probably fluctuating between about 9,300 cubic feet per second and 16,800 cubic feet per second, the average discharge being 9·63 cubic feet per second per square mile of the lake drainage-area, 1,150 square miles. The area of the lake is 110 square miles. The flow represents a rainfall of about 131 in., all running off, during the period over which the above average flow obtained. The average annual rainfall at Queenstown is low; and during the period for which the above mean flow was computed, was at the rate of 31·08 in. a year. To account for the observed flow, the rain- and snow-fall on the mountain-tops and higher slopes must be very great—greater perhaps than at Puysegur Point. This result, so far as it goes, is very valuable, as showing the flow that may be expected from any of the large lakes in the Alpine districts of South Canterbury and Otago.

There is a fall of 544 ft. in the Kawarau from Lake Wakatipu to Cromwell, a distance of, say, thirty-three miles. It may be that the fall in some reaches of the river is more rapid than at others, and at such places, by means of a dam and a tunnel of some length to take the water to a wider reach where the flood-rise would not be seriously great, a power scheme of some magnitude should be obtainable. The reaches of the river at the bends above and below the Nevis junction appear promising places to get a fair fall by tunnels up to about four miles long. If the river has its average fall in these reaches, schemes up to 100,000 b.h.p. could be got.

The Kawarau schemes, like those on the Waimakariri, would, I think, be relatively costly.

Shotover.

From Lake Wakatipu to the Water-level of the Shotover at Arthur's Point Bridge there is a rise of over 130 ft. The rise from Arthur's Point to Skipper's Bridge is about 490 ft. Above Arthur's Point there appear to be some very narrow gorges, where the river could be easily dammed. With a dam and a conduit about four miles long, a considerable proportion of it being in tunnel, an effective fall of about 250 ft. should be obtainable at the lake for the water from the Shotover. The power obtainable might reach 15,000 b.h.p. The dam would tend to clear the water from mining-silt—if made high enough to dam the water back for say two miles or more—possibly quite clear enough for working water-motors without very serious wear. The lake-areas in the Shotover basin are not large enough, nor do they trap enough of the drainage-area to regulate the flow to an appreciable extent. The drainage-area of the river above Arthur's Point is nearly 400 square miles, and the rain- and snow-fall on some of the high mountainous country must be considerable.

Sutherland Falls, Etc.

These falls, if in a more accessible locality, would furnish a good power scheme. The area feeding them is not large; but, considering the rainfall along the coast, it is very probable that each square mile of drainage-area would yield water enough to give over 2,000 b.h.p. at a station located at the foot of the falls. Altogether a considerable amount of power could be got from the falls.

There are rapids on the Arthur River near the Sutherland Falls; also the Bowen and Stirling Falls in Milford Sound. These would all be small schemes, and of no present value. If Lake Marchant, between the head of Caswell Sound and George Sound, is at any considerable elevation above the sea-level, it should give a fair power scheme, as it apparently should possess a good drainage-area. Lake Alice, at the head of George Sound, is another lake which might furnish a considerable amount of power, depending on its elevation above the sea. It is only about three-quarters of a mile from the sea. There are falls on the stream flowing from it.