

The track is laid with 56 lb. steel rails for seven miles of the distance, on the remainder 35 lb. rails being in use, the intention of the company being to replace these soon with the heavier variety. A level form of ballast is in use, exposing the entire upper surface of the ties, but extending beyond the ends. Water lubrication is practised on the sharpest curves, oil having proved dangerous, causing derailment.

Creeping of the rails has been successfully arrested by spiking 10 ft. sections of 2 in. iron pipe on four ties, with one end of the pipe braced against an angle bar: four thousand of these pipes are in use.

The maximum speed of trains is eight miles per hour. Safety of operation is helped by the numerous curves, which serve as a check to trains in making the descent.

Equipment.

The principal equipment of the road consists of four Shay locomotives and eight cars. The locomotives were built by the Shay Locomotive-works of Lima, Ohio. They are 30 tons net weight, and easily haul three loaded cars, the cars having a capacity of eighty passengers each.

The steam is applied through three vertical cylinders to a shaft having universal joints which has bevel-gearing connections with the wheels, allowing the locomotive to make the sharpest curves of 70 ft. radius.

Crude oil is used for fuel. It is obtained from Bakersfield, Cal., the cost being 80 cents per barrel in the locomotive, this against coal at \$9 per ton, four barrels of oil being about equal to a ton of coal. The chief profit of the road lies in this fuel-saving. A round trip requires about 120 gallons of oil with one car, and 150 gallons with three cars.

The cars were built by W. L. Holman and Co., 210-212 Fremont Street, San Francisco. They are of seven short tons weight, with seats extending the entire width, and have canopy tops, with curtains for bad weather.

From five to ten round-trip trains are run over the Mount Tamalpais Scenic Railroad every day. They carry a large number of passengers with safety and success. There is no difficulty in keeping the train under full control, accidents being unheard-of.

Application to Arthur's Pass.

It is my opinion that a survey at Arthur's Pass would prove that a temporary line like that at Mount Tamalpais would be feasible at reasonable cost. A free use of curvature should be made in order to avoid tunnels or other expensive features of construction and to avoid moving ground so far as practicable. It would also, perhaps, be advisable to use one or two short switchbacks to keep the line as near the stream as may be considered desirable, in order to take advantage of easier slopes than those presented at greater heights, and to cheapen the cost.

Such a line would be very useful during construction of the summit tunnel. It could be connected with the permanent line at either end and cars could be run through, establishing a regular traffic. If built, it might be found desirable to retain it as a permanent feature of the railway to enable passengers and tourists to view the beautiful scenery of Otira Gorge and Arthur's Pass. I strongly recommend that the survey mentioned be made.

I have, &c.,

The Hon. William Hall-Jones, Minister for Public Works,
Wellington, New Zealand.

V. G. BOGUE

APPENDIX A.—TABLES ACCOMPANYING FINAL REPORT.

TABLE I.

Name of Line.	Physical Characteristics of alternative Lines.											Estimated Cost of Construction.
	Length of East Approach.	Maximum Grade of East Approach.	Length of West Approach.	Maximum Grade of West Approach.	Total Length of Line.	Percentage curved.	Total Curvature.	Rise and Fall.	Level of Summit.	Length of Summit Tunnel.	Grade of Summit Tunnel.	
A	M. ch. 0 45	1 in 40	M. ch. 8 8	1 in 37	M. ch. 8 53	13	Degrees. 357	Ft. 1,189	Ft. 2,398	M. ch. 6 0	1 in 37	\$ 567,000
A 1	1 7.5	*1 in 40	7 54	1 in 30	8 61.5	19.5	809	1,285	2,446	4 73	1 in 36	517,000
A 2	1 4	*1 in 40	7 55.5	1 in 30	8 59.5	16.5	593	1,273	2,440	4 79	1 in 33	525,000
A 3	1 1.5	*1 in 40	7 56	1 in 30	8 57.5	13	419	1,273	2,440	5 45	1 in 33	537,000
A 4	1 6.5	*1 in 40	7 55	1 in 30	8 61.5	8	177	1,277	2,442	5 24	1 in 33	510,000
B 1	2 2.5	1 in 40	8 6.5	1 in 30	10 9	26.5	1,160	1,463	2,535	3 32	1 in 33	512,000
B 2	2 2.5	1 in 40	7 63.5	1 in 30	9 66	34	1,407	1,463	2,535	3 32	1 in 33	539,000
B 3	2 2.5	1 in 40	8 21	1 in 30	10 23.5	29	1,315	1,463	2,535	3 32	1 in 33	543,000

Grade level at Otira common point Ft.
Grade level at Bealey common point 1,255
Grade level at Bealey common point 2,352

*This does not agree with profile, which gives 1 in 44.