

along both flanks of the Southern Alps, and had there been any such signs on Arthur's Pass, or along the Otira Gorge, I had not been slow to detect and note the same.

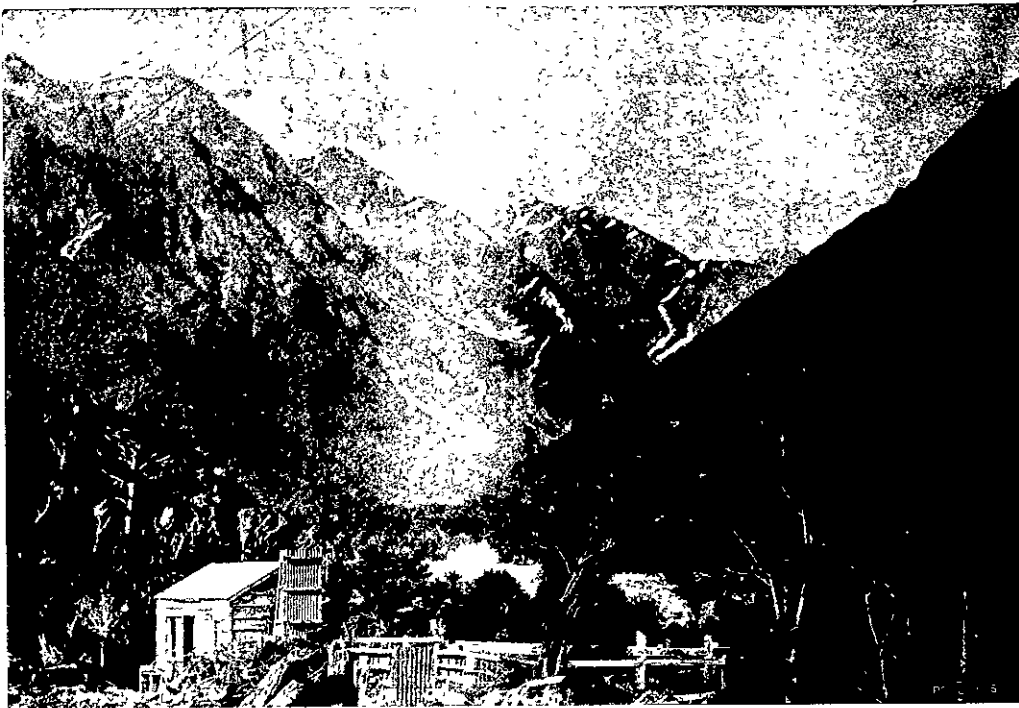
"As the rocks of Otira Gorge and Arthur's Pass are the same in age and character as the auriferous Maitai rocks of Reefton, the opinion of some of the mine-managers might be sought with respect to the standing quality of the rock in which they carry on mining operations.

"In Kelly's Ridge there is a change to a preponderance of black, slaty rocks, the sandstones being less abundant than farther to the east. Up Kelly's Creek these form high vertical bluffs that exhibit the characteristics of good standing country.

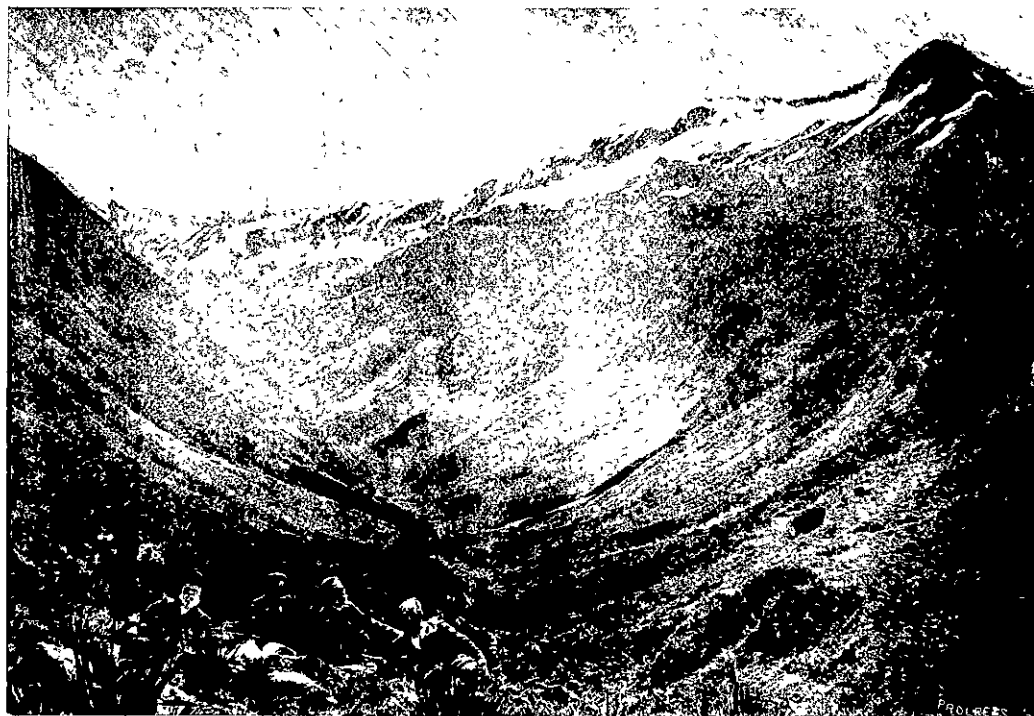
ALEX. MCKAY,
Government Geologist.

"Hon. the Minister of Mincs."

The tunnel is 5 miles 25 chains and 12 feet long. It enters the "Divide" in the valley of the Rolleston (see plan herewith) at an elevation of 1585 feet above sea-level on the western side of the Pass, and emerges near the Punch Bowl on the eastern side, at an elevation of 2535 feet, the Pass rising about



OTIRA GORGE; FROM THE OLD HOTEL



REAR SUMMIT OF THE RANGE, LOOKING TOWARDS CANTERBURY.
The figures (reading from left to right) are —W. H. Hales (Engineer-in-chief), J. H. Dobson (who surveyed the line), V. G. Bogue (the American consulting engineer), the late P. S. Hay (Engineer-in-chief), J. Thomson (resident engineer of the district.)

midway between these points to a height of 3000 feet. The line constructed as far as Broken river, through some very rough country, attains at that point a level of 1406 feet above sea-level and is under construction towards the Bealey, the route crossing the Waimakariri near the junction of the Cass with that river, at a point where the river bed narrows opposite the well-known bluffs. From the western side the line has been pushed on to Otira, which is 1255 feet above sea-level. Approach works are included in the tunnel contract, the length of country covered by which is in all about eight miles, and besides the actual tunnel construction there are cuttings, banks, protective works, and service roads to be provided for. The grade in the tunnel and the approaches is 1 in 33, and uniform throughout the entire length. The tunnel itself will be 15 feet 6 inches high, 14 feet wide at rail level, and 15 feet at its widest point, 6 feet 3 inches above rail level, lined at the sides with rubble masonry, concrete or brickwork, and with concrete blocks or brickwork in the arch.



OTIRA RAILWAY STATION.

It is interesting to compare the lengths of the longest tunnels in the world. The seven longest are —

- (1) Simplon tunnel, between Western Switzerland and Northern Italy is $12\frac{1}{2}$ miles in length.
- (2) St. Gothard tunnel penetrates the Alps between Italy and France, and is $9\frac{1}{4}$ miles long.
- (3) Mount Cenis tunnel is 7.9 miles long.
- (4) Arlberg tunnel, Austrian State Railways, Vienna, is practically $6\frac{1}{2}$ miles long.
- (5) Arthur's Pass tunnel will be $5\frac{1}{2}$ miles long.
- (6) Hoosac tunnel, on the Fitchburg R.R. in Massachusetts, is practically $4\frac{1}{4}$ miles long.
- (7) Graveholz tunnel, on the Bergen railway, in Norway, is the longest tunnel in Northern Europe, and is just upon $3\frac{1}{2}$ miles in length.

It is apparent at a glance that the Arthur's Pass tunnel, the fifth on the list, is longer than anything in the North of Europe, and heads the tunnels of the world, with the exception of the four famous tunnels in Central Europe.

The comparison of grades is even more favourable to the New Zealand enterprise.