

without slackening speed. For five miles we are swiftly descending in this way between walls covered by ferns and moss, through which make their way an endless succession of waterfalls. Gradually the road becomes less steep, and after a glimpse of a broad valley through the end of the gorge, we emerge into the open, and splash across the Oira River just below its confluence with a larger stream coming from a tributary gorge on the left. Again we encounter the railway, leading straight ahead to the West Coast, and up the Rolleston Gorge in the opposite direction to the Oira mouth of the tunnel, about three-quarters of a mile from the junction of the two streams.

For the first time since leaving the Plains we find ourselves in the midst of a fairly large community; for the extensive works at the end of the big hole has swelled the population to about 300. Little wooden huts are seen everywhere, either scattered about in picturesque situations at the fancy of their proprietors, or grouped in a township of over 50 on the left bank of the high railway cutting leading up the Rolleston. A cluster of superior dwellings on the opposite side of the cutting constitutes the "married quarters," for men who have brought their family to live with them. Past these, the railway curves sharply across the river upon a substantial steel and concrete bridge, leading directly to a black hole in the bushy spur forming the side of the gorge. This is the tunnel which has brought the community into existence, and which already penetrates over half a mile into the sandy slates of the Southern Alps.

Signs of internal industry are not wanting all round the mouth. In front is a broad platform, composed of broken stone from the interior, continually being augmented by trucks bringing out more spoil from the drills. Lines of rails radiate in all directions, and horses and a petrol locomotive are busily employed in hauling rolling stock about the yard. On the left is the old compressor house, containing the steam pump which did duty before the electric plant at Holt's Creek, on the opposite side of the gorge, was completed. The boiler is still used to supply hot water for the men's bathrooms, where shower and plunge baths may be had at any time of the day or night. It also supplies steam to the pipes that heat the drying room, where the damp clothes of the shift coming off duty are hung, to be ready for them when they go on again 16 hours later. The electric compressor house is in the river-bed on the right of the embankment, and is connected by a line of poles and cables with the power station at the foot of the narrow rift, wherein Holt's Creek falls down to the Rolleston and yields 600 horse-power to the pelton wheels in the station. Near the com-

pressor house is the carpenter's shop, where electric tools assist in the construction of the trucks and other wooden plant used on the works. Nearer the bridge is the concrete block factory, containing a large concrete mixer and a stone-crusher, both operated electrically. Shingle is collected by a tramine on the bed of the river, and lifted by an electric elevator to a large bin, where it is stored for making into concrete. On a terrace about 50ft above the mouth are the dwellings of the manager and engineers and the offices. All the shops and houses and the yard and pathways are lit by electric lamps, as work is continuous by night and day.

Inside the tunnel the main scene in all this activity is being enacted. Seven drills are usually at work here—three in excavating the lower part of the hole, technically known as the "bottom heading," while following them up are the remainder, boring at the "top heading," or breaking down the rock intervening between the two. The working face in the heart of the mountain is the forefront of the attack, and may be reached by riding in on the empty trucks returning for a further load of spoil. It is about 8ft wide and 7ft high—just large enough to accommodate the two machines working there, for all the world like machine guns firing into the rock, emitting a succession of reports in the most martial manner, and controlled by a workman rotating a hand wheel at the back of each. Light is afforded by acetylene lamps, which enable us to see the steel rods forming the drills proper, executing a rapid scene of hammer-blows on the rock. A labourer is by each of these, attending to the water jet which keeps the tool cool and washes out the dust and chipped stone. Twelve holes are made about 6ft long, and are filled with plugs of gelignite. The men retire to wooden shelters a few chains back, and wait for the explosion to take place. The broken material is then cleared away, leaving a new working face 6ft nearer the other side of the mountain. Boring begins again, and by a constant rotation of this cycle of operations, ceasing only at 11 p.m. on Saturday night, and recommencing at 1 a.m. the following Monday, the little band of tunnellers is moving into the range at the rate of about 80ft weekly. They do not always attain this amount of progress, for a band of extra hard rock will slow down the drilling very much. There is also the chance that a considerable spring may be tapped, letting water in on the men. On these occasions the shift consists of six hours instead of eight, the men being paid for the full time as compensation for having to work in soaking garments.

After inspecting the face, we return to the mouth on foot, noting the survey marks on the timbering overhead, by

means of which the engineers keep the tunnel from deviating from the true line, and ensure the two portions meeting in the heart of the range. This is perhaps the most impressive part of the whole undertaking to the unversed visitor, who can see no method, apart from instinct, of feeling one's way correctly through miles of solid rock. But as we near the mouth we can observe some of the proceedings by which the feat is being accomplished, for straight through the opening we can see, at the other side of the Gorge, a humble little building with a kind of short flagstaff projecting above the roof. This staff is exactly on the centre line of the tunnel, and provided the drive is always made in a straight line from this point, the error cannot exceed a very small margin, such as a few inches at the meeting point of the two drives. When we have finally emerged we can see how the position of the staff was obtained by the most direct and natural process in the world. Extending right over the spur, from the tunnel mouth to the other extremity, is a clearing in the bush, and a straight line has been surveyed and accurately marked right along this. The line has also been continued across the gorge, and up the mountain on the other side, so that the engineers have only to keep working upon this same line produced into the hill, to reach finally their desired goal.

Leaving the tunnel we make our way back to the Oira Valley, and continue into the quaint little town of Oira. From here we take the train to Grey-mouth, a distance of just over fifty miles. Much of this is a varied repetition of our previous experience, mountain, forest, and river uniting to present to us an exquisite succession of pictures that never lose their charm. The beautiful Lake Brunner is passed, and then a stretch of heavily wooded country where sawmills are busy cutting timber all along the line for dwellings in the Eastern province. Nearer the coast, signs of the coal industry are plentiful, and we actually travel directly past the big Brunner mine, where the fearful tragedy of about fifteen years ago took place. Now following the Grey River, in the bed of which dredge and nozzle are busy in the search for gold, our train stops its journey at the estuary port, the chief commercial town of that wonderful province where almost every mineral known to mankind is found.

Had we wished, we could have continued our journey northwards to Reefton, for the Midland Railway already extends beyond this point on its way to Westport, the metropolis of the coal trade. Forty-five miles of river scenery intervenes, not yet traversed by the rail, and a further gap of about the same distance separates this section from

Kiwi, the present terminus of the Nelson portion. A long time must elapse before the whole of the line projected by the old Company is linked up. The most needed stretch, however, that through the Alps, will be completed in some four year's time, shortly after the two gangs meet each other in the centre of the Dividing Range.

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