

been laid and ballasted up to 51 m. 40 ch. Practically nothing more remains to be done except completion of the runaway siding, which is still in hand.

Arthur's Pass Tunnel Contract (51 m. 40 ch. to 59 m. 40 ch.; 8 miles in length).—The tunnel extends from 52 m. 67·22 ch. to 58 m. 12·41 ch., and is 9,354 yards in length. At the beginning of the year the bottom heading of the tunnel at the Otira end had been commenced by hand-labour, whilst the power plant was in course of erection. No work had been done at the Bealey end, but the water-power service was in hand. Considerable activity has since been shown in all sections of the work, the power plants at each end of the tunnel have been installed, and with the advantage of mechanical drills considerable progress has been made with the headings. A temporary installation of a 45-horse-power air-compressor (steam-driven) was first made to enable three drills to be worked, and in September a two-foot fan driven by an oil-engine was set up. In February, 1909, the water-power from Holt's Creek was available, enabling the temporary power-provision to be dispensed with, and in June following the Punchbowl installation at the Bealey end was completed. The work done at the Otira end during the year consists of driving the bottom heading from 52 m. 68·81 ch. to 53 m. 34·81 ch., a distance of 46 chains, or a daily average of 10 ft. In March, 1909, a top heading was commenced at 52 m. 70 ch. and has been worked both ways, and now extends from the mouth to 52 m. 78 ch. Four chains and three-quarters of arch-excavation has been completed. During the final month of the year a commencement was made with concrete and block lining, a length of 16 ft. having been put in. The sheds and machinery for block-making are all in working-order, and a good stock of blocks is being made.

At the Bealey end no driving has been done during the year, but this work has recently been commenced. A temporary bridge has been built over the Bealey River, to enable the spoil from the tunnel-excavation to be used for banks. The concrete abutment for the permanent bridge was brought up to near the full height in April.

On the 30th June, 1909, the heading had advanced a total length of 1,044 yards.

Arrangements were made with the Canterbury Philosophical Institute to collect geological data during the progress of the work, and rock-specimens have been collected and temperatures observed accordingly.

Canterbury-Westland Section, Springfield End.

Torlesse Section (Opened Line).—The wind-screen on Broken River bridge has been extended at each end.

Cass Section (12 m. 18 ch. to 27 m. 40 ch.).—Earthworks are in hand throughout the whole length of this section, and are well on to completion. Slips along Sloven's Creek sideling from 13 m. 25 ch. to 14 m. and peaty ground thence to 16 m. have caused a good deal of trouble. Two months' work should finish all formation on this section.

Tunnels.—Except for two points all tunnels on this section are complete. Two retaining-walls have been finished, and the third is nearly complete.

BRIDGES.—Sloven's Creek Viaduct.—All concrete piers and foundations are built, all steel piers except one; also all pier-approach and head spans. One 80 ft. span is being erected; the other two required have not yet been commenced.

Sloven's Creek Pile Bridges.—Nos. 1, 2, 3, and 4 are complete; No. 5 nearly so; No. 6, piles driven; No. 9, pile-driving commenced. A stream-diversion obviated the necessity for Nos. 7 and 8.

Platelaying.—A commencement was made with rail-laying to Cass in June last, and rails are now up to 12 m. 50 ch. Rails have also been laid on bridges Nos. 1, 2, and 3.

Two platelayers' cottages have been built at Cass.

Bealey Section.—Earthworks, which are of a fairly light description, are in hand from 27 m. 40 ch. to 29 m. A resurvey and relocation of the line from 29 m. to 31 m. 40 ch. has been made.

The depths of foundations required for bridges over the Cass, Waimakariri, Mingha, and Bealey Rivers have been ascertained by borings.

NGAHERE-BLACKBALL (3 m. 40 ch. in length).

At the commencement of the year the formation of main line and bridges up to 2 m. 10 ch. was complete. Earthwork was in hand from that point onward to 3 m. 22 ch. The main work remaining to be done was the erection of Soldiers' Creek bridge, excavation of the big cutting at 3 m. and Blackball Station yard, and the filling-in with the resulting material of the approaches to Soldier's Creek bridge. The bridge and its approaches formed the key to the progress of the line. The erection of the bridge was let by contract, and the time allowed should have been quite sufficient to complete the work and allow the filling of approaches—the material for which had all to come from the north side over the bridge—to proceed. Unfortunately the contractor was ten months over time in completion of his contract, and eventually control of the work had to be practically taken out of his hands. The difficulty caused by this delay became so acute that a temporary trestle had to be erected to enable work to proceed. When this trestle was completed and it was hoped to make good progress heavy slips came down, causing a further two months' delay. In addition to these difficulties the season has been an extremely wet one—at one period rain being almost continuous for three months, thus interfering very greatly with the progress of the work. Pending the completion of the bridge as