The examinations held were for extra first-class engineer, first-class engine-drivers, second-class engine-drivers, winding-engine drivers, traction and locomotive engine drivers.

A detailed list of the candidates who passed these examinations, together with the grades and classes of examination, is shown in Returns Nos. 7 to 13, inclusive.

The various examinations were held at the following places: namely, Alexandra South,* Auckland,* Blenheim, Bluff, Christchurch,* Cromwell, Dannevirke,* Dunedin,* Fairburn's, Feilding,* Foxton.* Gisborne,* Greymouth,* Havelock,* Hokitika, Invercargill,* Levin, Mangonui, Masterton,* Napier,* Nelson,* Nevis, New Plymouth, Opononi, Palmerston North, Picton, Reefton, Rotorua, Roxburgh, Seddon, Shannon, Timaru,* Waitapu, Wanganui,* Wellington,* Westport.*

During the year there were thirteen meetings held by the Board of Examiners in Wellington, under the Inspection of Machinery Act, to issue certificates to engine-drivers, and to deal with the issue of reciprocal certificates from other colonies, as well as other matters.

Accidents.

It is with regret that I have to report a serious accident that occurred on the 5th April, 1906, to a boiler of the locomotive type belonging to Messrs. Wilson and Co., sawmillers, Kumara Junction, which caused the death of James Bull, John Charles Le Compte, and George Wilson, and injury to Joseph Batey. The boiler was of the ordinary portable locomotive type, and was made throughout of iron. It was about 12 ft. long over all. The barrel was 7 ft. 9 in. long, approximately, and 3 ft. 5 in. in diameter, and was made up of two rings lapped and single-riveted, the thickness of plating being $\frac{3}{8}$ in. The firebox was 34 in. wide, 46 in. long, and 42 in. high. Its sides and ends were stayed with screwed and riveted stays $\frac{3}{4}$ in. diameter of thread, pitched at front plate 5 in. by $4\frac{1}{2}$ in., two sides $5\frac{1}{2}$ in. by $5\frac{1}{2}$ in. Its crown was supported by four girders $5\frac{1}{2}$ in. apart, and having seven bolts in each girder. There were forty-one iron tubes, each $2\frac{1}{2}$ in. in diameter, expanded into tube-plates at either end, and three longitudinal stays, $1\frac{3}{16}$ in. in diameter at bottom of thread, in the steam-space above the tubes. The outer shell of firebox was $\frac{3}{8}$ in. thick. The inner firebox-plating was $\frac{3}{8}$ in., and the crown-plate was $\frac{1}{2}$ in. thick, and the tube-plates $\frac{1}{2}$ in. All the seams of the boiler were single-riveted, the rivets being spaced about 2 in. apart. There were eight mud-hole openings, $3\frac{1}{2}$ in. by 3 in., at bottom of the firebox, and manhole-opening in the cylindrical portion of the boiler, $10\frac{1}{2}$ in. diameter. The mountings consisted of one safety-valve, $2\frac{3}{4}$ in. diameter, loaded by lever and spring balance; one safety-valve, $2\frac{3}{4}$ in. diameter, loaded by direct spring; one steam-pressure gauge; one glass water-gauge and cocks complete; two test-cocks; one regulator-valve; one blow-off cock; one pump and check-valve; one injector and check-valve (injector of Pemberthy pattern). The boiler was made by Messrs. Marshall and Sons, of Gainsborough, in England, and was twenty-six years old. It had during that time been inspected on eighteen different occasions.

Nature of explosion: The outer shell of firebox ruptured at foundation ring, which was of the Z-iron construction, tearing the plate away at the line of rivets the whole width of plate, forcing the plate backwards the whole height of the right-hand side of box, and also the whole of the crown portion as far as the top row of stays on the left-hand side of the box. The shell plating of barrel-end and firebox-plating was rent asunder, and the barrel was hurled about 40 ft., at about an angle of 15°. The firebox took a direction at right angles, and landed about 60 ft. away. A portion of the roofing over the boiler was demolished and the engine was wrecked, the fly-wheel broken in pieces, the crank-shaft broken in two pieces, and the various parts of the engine scattered in all directions. The engine was bolted to the top of boiler-shell plating, and was of the high-pressure type, with two cylinders. The crank-shaft, with its brackets, was placed immediately over outer crown of firebox.

The cause of the explosion was due to the failure of about twelve stays in the right-hand side of firebox. These firebox-stays were screwed into inside and outside plating and had their ends riveted over. The twelve stays that were broken were situated near the top edge of plating. These twelve stays carrying away caused the plate to bulge, which threw a greater strain on the remaining stays on the same side. This bulging would tend also to set up a shearing strain on the remaining stays, as it would shorten the plate. The remaining stays were unable to withstand it, and the foundation ring, after all the stays had been broken, carried away in line of rivets.

The scantlings of the boiler generally showed very little wear-and-tear. The plating was remarkably well preserved and the boiler appeared to have been exceedingly well cared for, and all the inner surfaces were clean and free from incrustation. This boiler was inspected first on the 4th August, 1883, and was at that time owned by by the Anchor Foundry Company at Port Nelson, and was in their possession and used until 1886. In 1888 it was owned by Mr. Otto Petersen, of Greymouth, and used in a sawmill there until 1892. Messrs. Wilson and Co. became owners of it in 1896. The boiler since it was first used in 1883 has, with the exception of six years, worked continuously and has never been reported in bad order. It was last inspected by our Inspector on the 24th October, 1905, and reported by him to be in fair order. In a conversation I had with Mr. Wilson, one of the present owners, and who was present when the Inspector made his inspection, he assured me that the Inspector made a thorough examination of the boiler, and was most careful in every particular. I had a chat with the engine-driver on the 12th April. He was unable to throw any light on the explosion, but he said that there was neither overpressure nor shortness of water.

The owners were most courteous and helpful to me in my investigations, and answered any questions I put to them at once. I had the steam-pressure gauge tested for correctness at the railway workshops at Greymouth, and found that it registered 82 lb. when 70 lb. was on the boiler.

The loss of life is to be deplored, but had the mill not been stopped at the time of the explosion a greater loss of life would have probably taken place. Several of the employees had left the mill just

* Places at which examinations have been held more than once during the year.