

Electric Railway Notes.

The Montreal Street Ry. Co. has awarded the contract for building its new car sheds to the Canadian White Co., Montreal.

J. J. Gibson, Superintendent Hamilton Radial Ry., was presented with a roller top desk by the employees Sept. 30, on the occasion of his marriage.

H. T. Smith, who died in London, Ont., Sept. 29, drove the first street car in the city, and subsequently became Superintendent of the line.

We were advised Oct. 16 that the positions vacant on the London Street Ry. by the resignation of C. E. A. Carr, Secretary-Treasurer and General Manager, and of C. Tolmie, cashier, had not been filled.

D. Moyle, Toronto, is seeking to recover from the Von Echa Co., Woodstock, Ont., 5% commission on the sale of \$200,000 of bonds of the Grand Valley Ry., which has just been completed from Brantford to Galt, Ont.

J. H. Wallace, formerly assistant to the Chief Inspector, Toronto Ry., has been appointed General Superintendent of the Monterey Street Railway, in Mexico, which has been acquired by W. Mackenzie, of Toronto, and associates.

T. D. Benson is reported to have been appointed Secretary-Treasurer, and it is stated that no manager will be appointed. C. E. A. Carr, who recently resigned held the positions of Secretary-Treasurer and General Manager.

C. E. A. Carr, who recently resigned the General Managership of the London Street Ry., is reported by a London paper to have been appointed General Manager of the Winona Electric Ry., Winona, Montana. There does not appear to be a Winona in Montana. Possibly Winona, Minnesota, is meant. Another report states that Mr. Carr has been appointed General Manager of the Electric Company at Helena, Mont.

The Montreal Street Ry. has adopted as its standard the pay-as-you-get-on-car, described on pg. 263 of our June issue. The new car has proved very successful, the public having got accustomed to it, and the collection of fares upon entering the car is not a source of delay. Since this type of car has been in use, there has not been a single accident by persons getting on or off the same. Financially the car receipts show an increase of about 20% in earnings over the other types of car.

A. F. Townsend, who has been appointed Acting Manager, Cape Breton Electric Co., Sydney, N.S., has been engaged with electric railway, light and power companies since 1893, among the positions held being: Superintendent Lewiston and Auburn Electric Light and Power Co., Auburn, Me.; Superintendent of Distribution, Lowell Electric Light Corporation, Lowell, Mass.; Superintendent of Construction, Ponce Ry. and Light Co., Ponce, Porto Rico; General Superintendent Ponce Ry. and Light Co.; General Superintendent Cape Breton Electric Co.

The Electric Railway Employees' Union at its recent convention adopted a proposal to provide pensions for aged members. This involves the increase of the per capita tax from 10c. to 15c. a month, and the devotion of the increase to the creation of a fund of \$10,000. The plan provides for a pension of \$1 a week for members of 10 years' standing, \$2 a week for members of 15 years' standing, and \$3 a week for members of 20 years' standing, who have reached the age of 65 years and upwards, who are prevented from following their occupation. The Toronto branch of the union has adopted the plan, and taken the necessary steps to put it into effect.

The Vancouver Power Co., Ltd.

This company was incorporated in 1898 for the purpose of developing the Coquitlam Lake water power to supply the cities of Vancouver and New Westminster, B.C., and the adjoining municipalities with power, light and a general electric service. The first scheme of development did not include Trout Lake, but consisted of a long ditch and flume line, extending from the outlet of Coquitlam Lake to a point near Port Moody, where it was then proposed to have the power house located. This plan was found to be impracticable, owing to the unstable nature of the ground along the route of the ditch and flume line. The alternative route then proposed was a tunnel directly from Coquitlam Lake to the North Arm of Burrard Inlet. It was not until 1901 that this route was examined with a view of proceeding with the work. It was found on examination that Trout Lake was nearer Coquitlam Lake than any point of the North Arm of Burrard Inlet, and added to the advantage of this shorter route was the very valuable storage of water which this lake would create, acting as a balancing reservoir and enabling much higher peaks of power to be attained than if the tunnel was built directly through to the North Arm of Burrard Inlet. This scheme of development was accordingly decided upon, but a great deal of opposition was met with at about this time in securing the necessary water records, causing several months' delay in starting work. As a result, an investigation was finally held at the Government Offices in Victoria, and the Government decided that an important undertaking of this description should not be blocked by the obstacles put forward. As soon as this matter was settled, construction work was proceeded with. The dense forest covering the site of the proposed works was cleared off, excavations were made for the power house, pipe lines and dam, and steam plants were installed for the construction of the tunnel. After the whole scheme had been formulated and laid out on the ground by the engineers, Hugh Cooper, of New York, was called upon to make an examination of the ground and proposed plan of development. He reported "that the provisions of nature here existing are extraordinarily designed for the creation of a successful water power, and the plans provided by the company's engineers suited the conditions." The whole work, with the exception of the tunnel, the construction of the steel pipes, and the clearing of some of the land was accomplished by day labor under the direct supervision of the company's engineers. Trout Lake is situated near the North Arm of Burrard Inlet, and is distant about 16 miles from Vancouver. It has an area of about 500 acres, with an altitude of 400 ft. above sea level, and is separated from Coquitlam Lake by a range of mountains having an altitude of from 3,000 to 4,000 ft.; the two nearest points of these lakes being distant 12,775 ft. Coquitlam Lake has an area of 2,300 acres and an altitude of 432 ft. above sea level. The drainage area of this lake is about 100 square miles and the annual precipitation about 150 inches.

The chief features in the development of this power scheme are as follows:—A dam at the outlet of Coquitlam Lake to raise its level and create storage; a tunnel connecting the two lakes; a concrete dam across the outlet of Trout Lake, which increases the storage capacity of Trout Lake; pipe lines connecting this concrete dam with the power house situated at sea level, and transmission lines extending from this point to Vancouver, New Westminster, Burnaby and Lulu Island.

The dam at the outlet of Coquitlam Lake is a rock-filled timber crib structure, raising the level of Coquitlam Lake 10 ft. and diverting its overflow through the tunnel. It has been made especially substantial to with-

stand the passage over it of large drift logs at flood water. Before deciding upon the location of the concrete dam at Trout Lake, a large amount of preliminary work had to be done in order to ascertain the nature and exact position of the underlying granite bed-rock, which was covered over with a strata of hard-pan of varying thicknesses. Ten shafts were sunk through this strata, varying from 20 to 54 ft. in depth, and connected with drifts running along the bed-rock. In this manner the most suitable location was selected and proved. The excavation was then carried down to the bed-rock for the entire length and width of the dam, requiring the removal of about 20,000 cubic yards of hard-pan and boulders. The dam has a maximum height of 54 ft. and a width at its base of 40 ft., its length on the crest being 361 ft. It is penetrated by ten 54-in. and two 24-in. pipes, all fitted with a special design of gates and screens on the up-stream face. The concrete work amounts to 10,000 cubic yards, and was completed within five months from the date of its commencement, Portland cement being used chiefly in its construction.

The pipe lines extend from the dam to the power house, a distance of 1,800 ft. At present there are laid three large pipes and one 24-in. pipe. The upper 800 ft. of each line is constructed of wooden stave pipes with diameters of 54 in., and the lower 1,000 ft. is of riveted steel construction, varying in diameter from 48 in. to 42 in. at the lower ends. The grading of the trench and the provision necessary for the support of the pipes was probably the most difficult engineering problem involved. Near the lower extremity of the line a vertical rock bluff, 70 ft. in height, was encountered, which made it necessary to carry the pipes on a temporary trestle, built to suit the vertical curves which it was decided to give the pipes at this point. After the pipes were completed, these trestles were replaced with concrete piers. The pipe lines throughout were built to curves and tangents, both vertically and horizontally, angles being considered objectionable. For this reason it has a pleasing appearance and at the same time a little greater efficiency.

The tunnel connects Coquitlam Lake with Trout Lake and has a capacity of about 500 cubic feet of water per second, as nearly as can be calculated. In alignment it is straight, but the gradient from one end to the other is not uniform, having a slight summit at the centre. This was made necessary for drainage purposes during the construction of the work, which was carried into the mountain from both ends. The summit is 22 ft. lower than the Coquitlam portal, and the tunnel throughout is below the hydraulic gradient. The tunnel passes under a mountain about 4,000 ft. in height, and has a length of 12,775 ft. and a width and height of 9 ft. In getting the alignment, the engineers made a triangulation survey over this mountain, but in determining the levels, it was thought advisable to carry the survey around, instead of over, the mountain. This made it necessary to run about 20 miles of levels to connect both ends. A notable feature in this work is the intake gate at the Coquitlam portal which controls the flow of water. This gate is located in the solid rock underground, and is operated from another short tunnel which is 18 feet above the main tunnel at this point. The contract for building the tunnel was awarded to Ironside, Rannie & Campbell, of Vancouver, who started the work Jan. 9, 1903, and carried it through to its completion on April 27, 1905, making an average advance of 15 ft. a day. When both ends met the closing error in alignment was found to be only $\frac{1}{4}$ th of an inch, and the error in the levels only $1\frac{1}{2}$ inches. Considering the dangerous nature of this work, the contractors and employees are to be congratulated.