

framings overhead in the transformer house and generator room whence they are carried to the line out through eight-inch, vitrified, terra cotta piping built in the front wall of the station. Fifteen such pipes exist, thus providing for five three-phase circuits, and the outside orifices of these outlets are roofed.

The Pole Line.

The profile of the Kootenay-Rossland transmission astonishes one because of the extreme irregularity of the country it traverses from one end to the other. In fact, it resembles the work of the tracing pen on the recording voltmeter chart of a badly regulated incandescent plant, or perhaps even of a railway power service, much more than the profile of a transmission pole line. There is not over a level mile or two in its whole length, and the grades are of all degrees of steepness, reaching the maximum at about 70 per cent. Its length is practically 31 miles, in traversing which its altitude above sea level varies by over 2,200 feet. A distinguishing feature consists in the span of 1,500 feet that the line wires take in crossing the Columbia river, these wires being unsupported by cable. Both pole lines are of a very substantial type of construction, being of round, specially selected cedar, varying in length from 30 to 65 feet, according to location. They are set 100 feet apart, or 52 to the mile, with all corners and curves properly guyed. The right of way lies through a heavily wooded country throughout which a 100-foot clearance has been made from each pole line. The first line built was constructed in the ordinary manner, that is, without roofing, but before it was placed in service the wet snow piled up on the cross-arms to a height of nearly two feet in places, which led to the determination to roof the second line to prevent any trouble that it was believed would arise from snow. It should be explained that in the Kootenay country there is no wind whatever during snowstorms and hardly any wind arises at any time during winter. As the snow is of a very wet nature, there is nothing to prevent it piling up to the depth named on cross-arms, or clinging to the transmission lines until the diameter has been increased to four or even six inches, and oftentimes the accumulation will remain until dissipated by the Chinook winds so characteristic of Northwestern regions. Both cross-arms are roofed, the upper one, which carries four insulators, being covered with a cedar roofing 24 inches wide, while the width of the roof over the lower arm is one foot four inches. The pins are of specially heavy construction, having a shank $2\frac{7}{8}$ inches in diameter and 5 inches long from the shoulder. The length of the pin over all is $11\frac{1}{2}$ inches, which gives $6\frac{1}{2}$ inches from the top of the cross-arm to the top of the pin. These pins are of locust and the treatment administered to them consisted in boiling them in paraffine oil, after which they were taken out, and when cooled they were dipped in hot paraffine oil. No further treatment was given. Porcelain insulators of the Redlands type are used, and while the three wires of a circuit in three-phase transmissions are generally placed so as to form an equilateral triangle, the wires of the Kootenay transmission form an inverted isosceles triangle with 20 inches on the base and 22 inches on each of the sides.

The lines are No. 0, B. & S. gauge medium hard

drawn copper wire, with the exception of where they cross the Columbia and Kootenay rivers, where they are changed to No. 000 bimetallic wire, the increase in cross-section being for the purpose of maintaining the conductivity of the bimetallic wire equal to that had in the regular line. The Kootenay river is crossed in a single span of 600 feet, and the Columbia river by one of 1,500 feet in length. There is a sag of 52 feet in the stretch of 1,500 feet, and the strain is supported on ordinary porcelain insulators placed close together and mounted on very substantial framings. At times wet snow has adhered to the line wires at these crossings until it has reached a diameter of about four inches, yet trouble has not arisen therefrom nor from swinging crosses at the rivers, as the separation of six feet that has been placed between wires at these points has proven adequate to prevent it.

The Trail Sub-station.

At a point three miles from the sub-station in Rossland branches are taken off at right angles and carried to the town of Trail, which is four miles by pole from the main line. At Trail, where is located the great smelter of the Canadian Pacific Railway, the three-phase current is taken into a neat brick sub-station containing the usual equipment of choke coils, lightning arresters, and the high and low tension switchboard panels necessary for the safety and control of the three 135-kilowatt, oil-insulated, air-cooled, static transformers therein. These deliver three-phase current at 550 volts for the operation of various portions of the smelter.

(Concluded in next issue).

RAILWAY COLLISIONS.

The past month has been prolific of railway disasters in the form of collisions, many of them of the head-on description. The most serious occurred as the last number of the Engineer was being printed, at Wanstead, on the Grand Trunk, between London and Sarnia, when an express, filled with passengers returning after the Christmas holiday, ran into a freight and caused the death of 28 persons and the injury of 34 others, one of whom has since died. The express was running at the rate of 40 or 50 miles an hour. The express car was crushed to splinters and the baggage car telescoped a first-class car nearly its whole length, the body of the baggage car ploughing through the first-class car, about the top of the seats, killing or maiming nearly all the occupants. Those in the next car were uninjured, while those in the Pullmans in rear scarcely felt the shock. Both engines were destroyed. The coroner's jury failed to fix the responsibility on anyone in particular, though the evidence seemed to place it between the despatcher at London and the operator at Wyoming. Had there been an experienced operator, instead of a boy who was unfamiliar with his work, at Kingscourt Junction, the express might have been stopped and the catastrophe averted. An investigation is to be held by the railway authorities. Besides the damage to property, which will amount to at least \$10,000, the Grand Trunk will have to pay large claims to the relatives of those who were killed.