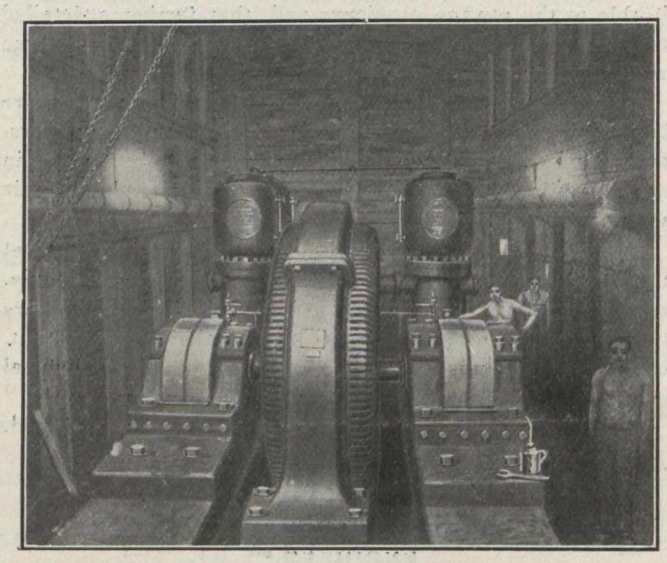
A LARGE ELECTRIC MINE PUMPING INSTALLATION FOR HANDLING HOT WATER.

In reopening the Ward shaft at Virginia City, Nev., a considerable flow of hot water was encountered, which for a time baffled the efforts of the workmen. The great depth of this shaft, 3,480 feet, and the high temperature of the water, 175 degrees, made the work of pumping out the impound quantity very difficult, but a temporary electric pumping outfit was finally successfully put into commission, and has since been supplanted by a permanent installation which easily handles the present continuous hot flow.

For emptying the mines, in the first place, a temporary motor-driven pump equipment was installed, by which compressed air driven sinker pumps at the bottom of the shaft lifted the water to a centrifugal pump on the 2,330 feet level. This in turn delivered to a vertical triplex pump on the 2,100 feet level. The sinker pumps were supplied with compressed air from two 100 horse-power Ingersoll-Sergeant compound air compressors driven by 100 horse-power Westinghouse motors located on the surface. The three stage Byron Jackson centrifugal pump on the intermediate level was belted to a 50 horse-power Westinghouse induction motor, while a 100



horse-power type " C " Westinghouse induction motor drove the 6¾ × 8-inch Knowles triplex pump at the uppermost pumping level.

This apparatus has since been replaced by the installation of the permanent pumping plant located in a pumping station 80 feet long, 24 feet wide and 20 feet high, connected with the shaft 3,100 feet below the surface. The permanent pumping equipment consists of a special slow speed, 800 horse-power Westinghouse type " H F " induction motor direct connected to a Knowles express type, duplex, double-acting pump, operated at 195 revolutions per minute.

The valves are of the automatic Poppett type arranged in nests of thirteen each, presenting a valve area of 104 square inches, which makes necessary very slight movement of the valves, and is conducive to a high speed and a minimum of wear. The valves and other visible parts are of bronze, and the pump has a capacity of delivering 1,600 gallons per minute against a total head of 1,550 feet.

The plant is equipped with a three-stage elecrically-driven air compressor for charging the air receivers, besides a vacuum pump and an automatic oiling system. For convenience of erection and repair, the pump station will be fitted with a 15-ton travelling crane; in fact, it is intended to include in this plant everything that will insure reliability and ease of operation.

The over-all dimensions of each pump are 27 feet 3¾ inches in length, 17 feet in width, and 14 feet 2 inches in height. The motor is 13 feet in diameter, and the steel crank shaft, forged from one piece, is 13¾ inches in diameter and 14 feet 4½ inches long. The total cost complete for operation was about $125,000. These pumps are supplied by either one of the two centrifugals located in the pump at the bottom of the shaft, and operated by special 75 horse-power Westinghouse motors on a vertical shaft.

The water is discharged through a 16-inch steel column with welded steel flanges. The thickness of this pipe varies from ¼-inch at the tunnel level to 9-16 inch at the bottom. The column is supported by means of heavy weight iron clamps six inches in length, which in turn rest upon the wall and end plates. To resist the pressure of 675 pounds to the square inch, male and female flanges are used and each fitted with a lead-filled copper gasket.

The electric current is taken down the shaft at 2,240 volts over a three-conductor, lead-covered, steel-armoured cable of 400,000 circular mils capacity. The electrical equipment, from the automatic oil circuit breakers on the surface to the motors themselves, is the best that money can buy; and in operation, with the splendid Westinghouse plants of the Truckee River Electric Company behind it, results have been obtained never before approached for this class of work.

The accompanying illustration of the present permanent pump house, 3,100 feet underground, was retouched from an actual flashlight photograph obtained during a recent visit to the mine. The normal temperature of this pump room, 110 degrees Fahrenheit, is attested by the costume of the men, who work their daily shifts of twelve hours under these conditions.

RAILWAY STATISTICS OF CANADA

The returns of Mr. J. L. Payne, comptroller of statistics have been presented in a report by Mr. M. J. Butler, Deputy Minister of Railways and Canals. The report is for the year ending June 30th, 1909, and is made up from sworn returns furnished by the several railway companies and contains information of great value to engineers and officials of the transportation companies. The complete report will be very useful for reference purposes.

Steam Roads

During 1909, there were 24,104 miles in operation, being an increase of 1,138 miles over 1908.

The distribution of railway mileage, with the increase for the year, by provinces, is as follows:—

		Increase
Ontario	8,229.11	296.21
Quebec	3,662.94	89.29
Manitoba	3,205.30	94.39
Saskatchewan	2,631.34	550.04
Alberta	1,321.52	.....
British Columbia	1,795.94	63.11
New Brunswick	1,547.25	37.89
Nova Scotia	1,350.53	6.48
Prince Edward Island	269.33	1.83
Yukon	90.91	.....

It may be explained that in the province of Alberta considerable railway building has been in progress during the past two years, but it was all returned as being still under construction on June 30.

Of cognate importance is the increase in second track and yard and siding trackage. The facts are as follow:—