horse-power. Enclosed alternating arc lamps are used exclusively and these are burned from the 110-volt commercial circuits. The ultimate distribution is on the Edison three-wire system through the use of type H transformers taking either 1,040 or 2,080 volts on the primary and delivering 230 volts across the outsides of three-wire service. The utmost care has been exercised in preserving the balance on the three-wire distribution circuits, as well as in balancing the primaries of the commercial transformers on the three-wire, three-phase, 2,200-volt circuits, and this balancing has been carried out so well that it has never been observed that the phases of the 2,200-volt circuits have been more than 10 amperes out of balance.

The principal interest in the Kootenay-Rossland transmission centres in its application of electric power for mining and milling purposes, the most notable installations being in the properties of the War Eagle Mining and Development Company, the British Columbia Bullion Extraction Company, the British-American Corporation, and the Gertrude, Big Three and Iron Mask mines. These six properties alone consume about seventeen hundred horse-power in the operation of hoists, compressors, crushers, conveyors, ventilating blowers and in electrolytic work. The bulk of this power is delivered by induction motors, for as a general rule, synchronous motors have been applied only to the driving of compressors. The controller of the War Eagle hoist is a standard General Electric induction motor. It has a three-phase equipment operated at 2,300 volts, has twenty-four poles and delivers three hundred horse-power at three hundred revolutions per minute. Its technical designation is, therefore, "I 24—300—300 form A." The rotor shaft is geared to a Ledgerwood type double drum hoist through double reduction gearing, having a ratio of reduction of 300 to 40.

The principle under which variable speed is attained in the operation of this induction motor is found in the fact that while in the synchronous motor, exact synchronism between the motor and generator must always be maintained, yet the induction motor is so constituted as to be nearly independent of any magnetic slippage that may exist between its stator and rotor. When under full speed the motor is practically in synchronism with the generator, but with the generator speed constant a variable speed in the motor is best attained by the introduction of methods that will provide variable slippage as desired, for the greater the slippage the slower will be the speed of the rotor. The equipment at the War Eagle hoist is so controlled that the speed of the motor may be varied from forty revolutions or less per minute to its full speed of three hundred revolutions.

One who is interested could spend hours in watching the operation of this hoist. It is easily handled by one man, who finds himself with much less to do than has the motorman on an electric railway. In fact, the operation of the War Eagle hoist finds greater resemblance to street railway practice than one would imagine. The controller is manipulated with the same ease and celerity that attends the handling of a street railway, and it is more simple than the modern street railway controller in one regard, and that is the fact that reversal is accomplished in the War Eagle controller by the moving of the controller handle in a reverse direction rather than in the throwing of a special lever. At times when men are on the cage the hoist is kicked along by the momentary application of power to the motor, which enables it to be run at much slower speed even than that possible with the controller on the first notch. At other times in hoisting ore, a dead load of five tons of which is almost always carried, the motor will be brought to speed in a very few seconds and this without any abnormal inrush of current, for, as stated, during the writer's observations of the operation of the equipment under all conditions of service the motor intake did not exceed 110 amperes per phase. The motor has an efficiency of 92 per cent. and a full load power factor of 88 per cent., while at the slowest speed the power factor may drop to possibly between sixty and seventy per cent. Current for the operation of the entire War Eagle equipment is sold by contract; i.e., on flat rates.

The next feature of interest in the electrical installation at the War Eagle mine is found in the 300-kilowatt synchronous motor operating the 40-drill compressor. Three-phase current at 2,300 volts is applied to this motor which runs at 200 revolutions per minute. It is of the revolving armature type, has thirty-six poles, and, consequently, bears the designation "A P 36—300—200." A General Electric multipolar exciter is driven from a large pulley on the free end of the motor shaft, and this exciter has an output of nine kilowatts at 125 volts when operated at 1,450 revolutions per minute. The compressor, which is of a double duplex type, is driven through independent ropes applied direct. The method originally installed for starting the synchronous motor consisted of a thirty horse-power induction motor belted to a counter shaft through a friction clutch, this shaft carrying a spur gear by means of which the armature was brought up to speed. This equipment did not prove satisfactory, and the motor was replaced by one having more than double its capacity. A number of small motors ranging up to 20 horse-power are used in and about the War Eagle mine for ventilating purposes, driving conveyors, etc., and all these motors are of the induction type except that on the compressor.

At the Iron Mast mine is a 75-kilowatt "S. K. C." synchronous motor, made by the Royal Electric Company of Montreal. It is a two-phase motor, with connections altered for three-phase service, and is started through an "S. K. C." induction motor and water rheostat. The water rheostat consists of three fan-shaped blades plunged edgewise into a three-compartment tank of water, thus enabling the water resistance cut into each leg of the three-phase circuit to be varied according to the depth of immersion. The 75-kilowatt motor is belted to a jack-shaft which drives two double-acting compressors having a combined capacity of ten drills. This is the only Stanley equipment on the West Kootenay circuit, and its service is most reliable.

In the Big Three mine is a 75-kilowatt General Electric synchronous motor, driving a seven-drill compressor, while at the Gertrude mine is a 50 horse-power General Electric induction motor operating a hoist. The British Columbia Bullion Extraction Company has one 50 horse-power induction motor driving