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ELECTRIC MINING IN THE ROCKY MOUNTAIN REGION

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The superiority of electric power for mining purposes was recognized in a general way as soon as the electric motor became a practical success, but it has required time and experience to amplify and fully develop its advantages and to overcome the minor difficulties that arose.

ADVANTAGES OF ELECTRIC POWER.

These may be considered under three heads, based on the nature of the generating power:

I. Electricity generated by water-power.

(*a*) Saving of coal, water for steam (an important item in many places), firemen, handling ashes, boiler repairs.

(*b*) Electric motors, as now made, require less attendance and repairs than steam or compressed-air engines.

(*c*) Underground wires more convenient than pipes.

(*d*) Avoidance of losses by steam-condensation underground.

(*e*) Avoidance of bad effects of steam underground—heating mine, vitiating air, rotting timbers.

(*f*) Electric motors more efficient than the small steam and compressed-air engines used on hoists, pumps, diamond drills, etc.

(*g*) Rotary motion of electric motor superior to reciprocating motion of engines, for many purposes, especially blowers and diamond-drills.

(*h*) Electric locomotives peculiarly adapted to underground haulage where steam is impracticable.

II. Electricity generated by steam at some distant point where fuel and water are cheaper.

(*a*) Saving of difference in cost of fuel and water between places where power is generated and used.

(*b*), (*c*), (*d*), (*e*), (*f*), (*g*), (*h*) same as under I.

(*i*) Superior economy of large compound and, where practicable, condensing engines, over the small, inefficient engines used on most mining machinery, proper allowance being made for losses in transforming and transmitting electric power.

III. Electricity generated by steam at place where power is used.

(*a*) Disappears.

(*b*), (*c*), (*d*), (*e*), (*f*), (*g*), (*h*), (*i*), same as under I. and II.

Most of the electric mining-plants in this district are included in Class I.

Mr. Edward G. Stoiber's Silver Lake Mines plant, described below, will be, when completed, an example of Class II., or rather a combination of I. and II., as a steam-plant of the highest possible economy will be used to reinforce the water-power, which is not sufficient throughout the year.

The Metallic Extraction Co.'s pumping plant at Florence, Colorado, is between Classes II. and III. Electricity is generated by steam in the mill and transmitted 1500 ft. (later 4500 feet) to the pump located near the river, avoiding, on the one hand, the carrying of steam that distance, and, on the other, the keeping of a man at the pumping-station.

Class III. is illustrated by the plants of the Pleasant Valley Coal Co., at Castle Gate and Scofield, Utah (hoisting and hauling); the Union Pacific Coal Co., Rock Springs, Wyoming (hauling); and the Colorado Fuel and Iron Co., Rouse, Colorado (pumping, ventilating and miscellaneous power).

COUNTER CONSIDERATIONS.

Against the advantages enumerated in the preceding section must be charged interest, insurance, taxes and depreciation on the excess of cost of water-power and electric plant over a steam-plant for doing the same work; also the greater cost of attendance, if any, due to the location of machinery at two places, although this will in many cases be more than offset by the saving in attendance on motors, as compared with steam-engines and boilers.

CONDITIONS AFFECTING THE COST OF PLANT.

The cost of an electric-transmission plant depends chiefly on three conditions:

First. Nature of water-power (assuming such power to be used) and cost of developing it.

Second. Distance of transmission.

Third. Electromotive force or voltage used.

In order to show more clearly the effect of distance and voltage on cost of plant, it may not be inappropriate to state briefly the principal electrical laws involved in the problem.

ELECTRICAL LAWS AND FORMULÆ.

(1) Electromotive force, "pressure" or voltage (symbol, E. M. F. or E.; unit. the volt) corresponds to pressure of water in pounds per square inch, or head in feet.

(2) Current (symbol, C.; unit, the ampere) corresponds to flow of water in cubic feet per second.

(3) Power (symbol, P.; unit, the watt) corresponds to the power of falling water, and is equal to the product of electromotive force and current, just as water-power is proportional to the product of pressure or head and flow.

1 Kilowatt = 1000 watts. 1 H. P. = 746 watts. 1 Kw = 1⅓ H. P. Formula, P = EC.