able feature is the use of the hoisting derrick on car trucks. There are many other economies obtainable from electric haulage.

This paper will not attempt to discuss the relative merits of various systems. However, we can point out some valuable features of both the alternating current and direct current systems. These systems of power transmission have been explained so frequently that it seems scarcely necessary to touch upon them here, and it is sufficient to say that the variable speed system for direct current motors advocated by electrical manufacturers is becoming recognized as the only thoroughly satisfactory method of obtaining speed variation of motors used in connection with machine tools; namely, by means of shunt field control, either alone on single voltage systems by standard motors and the auxiliary pole motor, or the two voltage motors on the three-wire system of standard commercial voltages.

The wiring involved in the latter systems, however, is sometimes mentioned as objectionable, hence, the development of the direct current auxiliary pole type of motor, which presents the acme of simplicity, together with remarkable operating characteristics. The results obtained in this type of motor in eliminating sparking, and thus increasing the life of the commutator, are of direct benefit to every user of motors. The action of the auxiliary poles and windings in producing sparkless commutation is a matter, however, which will be of less interest to the user of motors than the question of how the development of the motor of this type makes a distinct saving in the layout and operation of the industrial plant. Up to the time when the auxiliary pole motor was commercially developed, there was no single voltage variable speed motor with suitable speed characteristics which could be built in all sizes required for machine tool operation, and for such speed variation as would give the best performance for each class of service. Wide speed variation, simplicity of control, and saving in wiring in the distribution system, make the handling of these motors easy for an inexperienced man, and insure a minimum amount of trouble and interruption of the work.

The characteristics of the alternating current motor are now quite generally known, and only the features which make a motor of this type desirable for machine, shop or factory drive will be mentioned here. These motors are characterized by the absence of commutators, are built to withstand severe overloads, and, on account of their construction, are unaffected by dirt, iron fillings, and other foreign matter.

The alternating current motor is mechanically extremely simple. It only requires enough-attention to keep the oil wells filled and to see that the oil rings are rotating properly. A number of successful