

ELECTRICITY IN COAL MINES

By John Liston, General Electric Co.

The use of electricity in coal mining is not new, as it has been employed to a limited extent for many years. The rapid extension which has recently characterized its application is due to several causes, the more important of which can be briefly outlined as follows:

First, the improved efficiencies of modern electrical machinery in general, and the increasing use of alternating current with its greater flexibility in transmission over distances which are beyond the economical limit of direct current distribution.

Second, the specialization of the electrical manufacturing companies' engineers on the power requirements peculiar to coal mine operation.

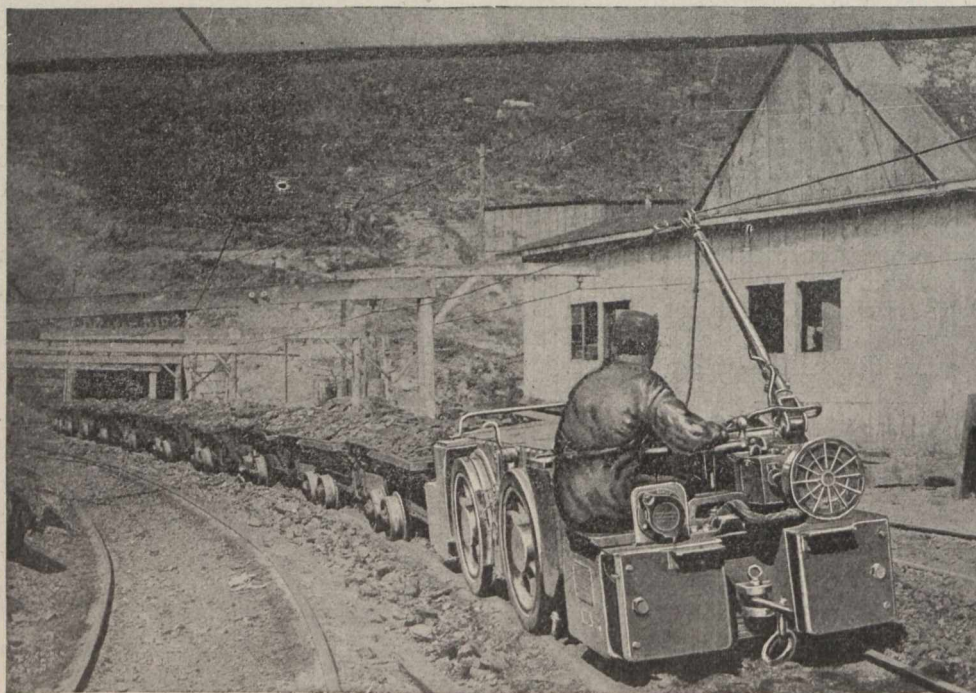
Third, the growing appreciation by the engineers of the mining companies of the advantages of electrical power and their active co-operation in the solution of the problems entailed by special conditions.

Fourth, the notable operating economies which have resulted in numerous installations utilizing electric power, even under the severest service conditions, and the attainment in practically every case of an increased output for a given power consumption.

In some cases, however, the engineers of the mining companies are not fully aware of the inherent economy of electric service and its practically universal applicability, and are, therefore, disinclined to supersede older equipment which, while not so economical in operation, has still proven its practical utility.

Mine Locomotives.

The superiority of the electric locomotive for mine haulage is largely due to the fact that in addition to its high efficiency, mechanical strength, dependability and simplicity of control, it is the most compact form of tractor available. This last characteristic is of the utmost importance in underground operations where the available headroom is usually limited and where the cost of increasing the height along a roadway—either by brushing the roof or taking up the bottom, would materially increase the cost of mining. Except in special cases it is obvious that steam locomotives cannot safely be used in the mines, and the compressed air type also has many limiting features. It can develop an average efficiency of only about 25 to 30 per cent.—is more cumbersome than the electric type, for a given capacity, and



Fifth, the necessity for the development of coal fields in which the geological conditions were such that the mines could not be economically operated by the older methods, and the continually increasing distances between the working faces and delivery points in mines already in operation which tended to render electric haulage practically imperative.

That the above causes are all given the practical consideration which their effect on operating costs so fully merits, is clearly demonstrated by the fact that in all recent coal mining developments of appreciable size electricity has been adopted as a source of applied power either wholly or in part.

In many of the older workings it has been found that true economy would sanction the scrapping of a large percentage of the steam power equipment and its replacement by a centrally located generating station.

the necessary frequent re-charging of the storage tanks involves delays which diminish its serviceability. The distance which it can travel on one charge is limited.

In the development of the electric mine locomotive there has been a constant improvement in the structural details, as the arduous service conditions which are normally encountered in coal mine operation have become more fully understood by the designing engineers. Due to the compact and heavy structure necessitated by the tractive requirements and limited headroom in which it must ordinarily be operated, the electric mine locomotive has from the first been unusually strong mechanically, and the earliest locomotive of this type built by the General Electric Co. is still in daily use after a constant service of 22 years. Three general forms are now commonly used, i.e., the straight haulage, the cable reel or gathering, and the combination or