passenger, with practically no additional cost and showing very large returns.

Taking up the possibilities of the alternating motor in general haul work, the problem had to be treated in a very general way in order not to lose sight of the scope of the problem in considering local details. The average specific problem has its local conditions, which must be carefully considered in detail, and, in many cases, would show a greater return for the money invested than indicated in this paper. For instance, all power is supposed to be generated from coal from power house devoted to the interests of railroading alone. Along many of our roads exist water power facilities which could be advantageously developed and furnish power much cheaper than the figures assumed from coal generation. Furthermore, the cost of power in the smaller generating station capacity has been assumed as high as one cent per kilowatt hour or more, and should a generating station supply other industries, such as mining, lighting, general power distribution, etc. the cost of purchasing power would be consideraby decreased with a consequent reduction in cost of operating electrically. The results given in the table therefore are of general application only and may be considerably modified when considering the local aspect of a given proposition. It is believed, however, that the results as obtained are based upon conservative assumptions, in fact, most of these assumptions were obtained from operating conditions, and, with the figures given, outline somewhat briefly the possibilities of the alternating current single phase motor in the railway field.

The operating expenses considered include fuel, wages, repairs, oil, waste, water, and five per cent. depreciation on the electrical installation. No depreciation is charged off against the locomotives, as although the electric locomotives cost more than the steam, they will permit of a greater mileage, so that the total capital invested in locomotives should be practically the same in either case. There are a number of expenses incidental to steam operation other than those considered which must be done away with with the adoption of the electric locomotive. While each of these expenses is small they may amount to considerable in the aggregate. For example, the electric locomotive is double ended and requires no turn table. Two electric locomotives can be coupled together and operated by one engineer in the cab of the leading locomotive, each locomotive doing an equal share in hauling the train. In fact, it is not strictly necessary to consider the use of a fireman in electric propulsion, as his duties will be largely confined to ringing the bell, and waiting for the engineer to die of heart disease. His services can be dispensed with entirely if we consider that the electric locomotive cab can be made the caboose for the train, and the train crew serve as