

per cent than the import traffic involves unavoidably an uneconomic condition, due to the necessity of moving empty cars, although it is this very inequality, as before indicated, that has caused the thriving condition of the country in general. The profit from passenger transportation comes mainly from the third-class travel, the express traffic being operated at a loss.

The present rates for passenger travel are: first class, 7 sen per mile; second class, 4½ sen; third class, 2½ sen. There is an additional charge for travel on express trains, amounting to three, two, and one yen per five hundred miles for the said three classes, these express trains being equipped with sleeping and dining cars. Special temporary reductions in rates for both passengers and freight have occasionally been made by the company, in order to meet unusual conditions, such as famine relief, moving of refugee emigrants, and the encouragement of local industrial developments.

Under ordinary conditions, travelers between Europe and Japan or China can save both time and money by utilizing the South Manchuria Railway; but at present the friction between China and Russia is interfering.

In spite of serious obstacles, such as banditry and numerous threats of war, there has been a remarkable growth of traffic in the last two decades; for the number of passengers carried per annum has increased five-fold, and the tonnage of freight twelve-fold. A large part of the latter increment is due to the steadily augmenting volume of coal mined by the company, but a considerable portion comes from the ever-increasing amount of agricultural produce, especially that of the Manchurian bean.

In 1908 the company employed some three thousand officials, ten thousand "workers," and thirty thousand coolies; and in 1928 these figures were augmented, respectively, to about nine thousand, twenty-five thousand, and seventy thousand—an average increase of 142 per cent.

In respect to specific developments, I shall make the following comments on a few of the more important ones, my re-

marks being based on both official statistics and personal observation.

Railways and Terminals

From all I saw of the railway system, I would draw the conclusion that, to an eminent degree, it is properly designed, well maintained, and economically operated. The character of the station buildings is adjusted to the importance of the locality, as is indicated in Figs. 21, 22, and 23. The terminal yards are well laid out and are ample in capacity, as can be seen in Fig. 14.

Bridges

Of the 2,232 spans on the entire system, only 569 are of modern, Japanese design, the remainder being old Russian bridges. The Japanese structures were computed for Class E 50 loading, while the Russian structures vary in capacity from Class E 45 to Class E 22. It is intended ultimately either to strengthen or to replace all of the 1,663 Russian spans, so as to have all bridges on the line made capable of carrying Class E 50 loading. A good comparison can be drawn between the two types of structures by an examination of Fig. 12, which shows a bridge of each type in juxtaposition. It was very gratifying to me to learn that all the new bridges are being designed in strict accordance with the principles, directions, and specifications given in my various technical books and papers.

Highways

To what extent the highway system of South Manchuria has been developed, unfortunately, I neglected to enquire, nor have I any statistics on the subject; but I traveled over an excellent highway between Dairen and Port Arthur, and beyond (Illustrated in Fig. 26), the covering thereof being tarred and well-rolled macadam. Many of the streets of Dairen are paved in the same way; but I saw there several other types of pavement—all in good condition.

Tunnels

The railway tunnels are well built; and I noted two excellent highway tunnels between Dairen and Port Arthur.