firemen. I have ridden hundreds of miles on engines in India, in England, in France, and in the United States, and I have always found the American engine most easy and comfortable, but I never did the English or the Continental engines. As an evidence of this unsteadiness in English-built engines, I may quote the following from the *Railway Service Gazette re* "Narrow-Gauge Engines in India:"—

"The speed on all narrow-gauge lines in India is restricted to fifteen miles an hour, and to run trains on our 3 ft. 3 in. gauge railways at a much higher speed is not safe, owing chiefly to the unsteadiness of the locomotives employed. The wheel-base is rigid, the whole engine is stiff, and, the weight not being equalized, through these and other causes they are very unsteady, the oscillation is very great, and the rigid wheel-base jars going round the sharp curves of the metre gauge. It is also almost impossible to give these engines their full hauling power, simply because the greater portion of the weight cannot be thrown on the driving-wheels."

Another point I have to make is the mistake we make in adhering so obstinately to our old-fashioned system of running the engine with only one crew. Every one who understands the construction and powers of the engine must see that it is capable of a far higher average annual duty than 16,000 to 20,000 train-miles. The engine should be kept in steam as long as possible, in order to avoid the wear and tear due to expansion and contraction which ensue under the present system of daily drawing the fires. The continuous running system would save considerably the present consumption of fuel in the daily getting up steam. They do not find in America that the double-crew system involves any greater cost in repairs and renewals: indeed the life of their engines compares most favourably with the life of engines in this country and on the Continent.

The duty of the driver is to run his engine and keep her in order on his daily trip from depôt to depôt; he has nothing to do with her in the stable or depôt; there she is cleaned, repaired, and got in steam by other hands employed for that purpose. When one crew have taken the engine over their daily stage another crew run her on, and so they oscillate to and fro, the engine stopping only for repairs and to be washed out. Mr. Juland Danvers's report for 1876–77 shows (on page 11) the number of engines on the whole of the guaranteed railways in India to be 1,425, and (on page 31) that the train-miles were 21,609,411, which gives an average of only 15,164 miles per engine. Deducting say 33 per cent. from the days of the year for the monsoon season, and for repairing-days, there are then 240 days in which the engine should be capable of running 100 to 200 train miles per 24 hours, or from 24,000 to 36,000 train-miles per annum. Mr. Danvers's report, however, shows that the average mileage per engine was only about 60 miles per 24 hours for, say, 240 days.

From the official returns of the New York Central Railway I find that thirteen of the engines in 1877 made a combined monthly average of 6,238 miles for the entire year; four of these ranging from 7,104 to 7,218 miles per month, while the average for the year of all the 97 engines in service was 38,422 miles per engine. One engine in 15 months averaged 7,858 miles per month, or over 255 miles daily for 461 consecutive days, including Sundays. The total life of these thirteen engines was 98½ years, which gives 39,948 miles per annum for each engine for their entire life. The cost of these engines in repairs per mile run was 27·10 per cent., which is equal to less that $1\frac{4}{10}$ pence per mile. Mr. Ely, the Locomotive Superintendent of the Pennsylvania Railroad, gives the following data in reference to twenty of their engines on the heaviest portion of their system over the Alleghany Mountains for the year 1877:—Ten passenger engines' average annual mileage was 45,554½, and cost of repairs per mile run was 3·48 cents; ten goods engines' annual mileage was 2,574½, and cost of repairs per mile was 3·65 cents; general average of all twenty engines was 39,065½ miles per engine, and cost of repairs per mile run 3·56 cents. One of their passenger engines, No. 133, averaged 237½ miles daily for an entire year (1872). This engine ran, in 1869, 44,616 train-miles; in 1870, 42,900; in 1871, 54,139; in 1872, 86,724; in 1873, 41,979; and in nine years' run it averaged 47,528 per year. Another of their passenger engines, No. 914, ran, in 1874, 60,604 train-miles; in 1875, 58,344; in 1876, 57,225; in 1877, 49,257. A goods engine, No. 447, ran, in 1870, 41,184 train-miles; in 1871, 44,108; in 1872, 42,537; in 1873, 36,877; in 1874, 35,580; in 1875, 36,508; in 1876, 45,529; in 1877, 39,193. This makes an average of 40,189 miles for each of the eight years this engine has been running. On the Erie Railway, Mr. H. J. Jewett, in an official letter, dated 8th April, 1878, gives the following mileage of four engines built by the Rogers Locomotive Works, of Paterson, New Jersey:—

	Mileage.	Placed in Service.
Engine No. 201	635,169 ...	9th June, 1854
Engine No. 202	632,548 ...	26th June, 1854
Engine No. 203	658,548 ...	15th July, 1854
Engine No. 204	539,186 ...	29th July, 1854

These engines had new boilers in 1871, the original boilers running seventeen years. He reports these engines good for eight years' more service at least. He also reports two other Rogers engines, No. 313 and 327, as running with their original fire-boxes since 1865, or thirteen years. The above-mentioned mileage gives an average for the twenty-four years of 25,677 miles per engine. You will observe that these engines on the different railroads must have been well constructed in the first instance, that they could not have been long in the repairing shops, and that they must have been kept in good running order notwithstanding the high duty they actually performed. This is really very remarkable, when you consider the very severe winters of the Middle States, and how destructive snow is to machinery, as well as Jack Frost, when it breaks up in the spring.

In order to arrive at a fair comparison with the cost of repairs in England, there are a number of points which should be equated, such as cost of labour and materials, effects of climate, steeper gradients, sharper curves, and heavier loads hauled, as in all these the American engines labour under greater disadvantages than engines in this country or in India. The Americans economize far more than we do in the first cost, and in repairs and renewal, by adopting a system of interchangeability of parts as much as possible, and by limiting the number of types or classes of engines. It may be said that for all ordinary traffic requirements of any railway system three types are sufficient. The Americans have perfected the three classes known as C, D, and E. Class C is for passenger service, and for