

India. I am confident that American engines will cost no more, if so much, as the freight from New York to Bombay, Madras, and Calcutta is nearly the same as from Liverpool, say 40s. per ton.

I find, from the official reports of the Colony of Victoria, that the American locomotives built for the Government Railways by the Rogers Locomotive Works of Paterson, New Jersey, cost, erected in Melbourne, £2,132 each; whereas those built in England, and erected in Melbourne, cost from £2,352 to £3,032 each, and those built in the colony itself cost erected from £2,939 to £3,571 each. The American engines for the Colony of Victoria, and for the New Zealand Government railways, were ordered through Mr. W. W. Evans, Mem. Inst. C.E., who has an office in New York, at 66½, Pine Street. They were built and shipped under his direction entirely. The best American narrow-gauge engines cost, delivered f.o.b. in New York, as follows:—

1st Class Passenger (C)	...	...	...	£1,500 per engine.
1st Class Goods (D)	...	...	...	£1,600 per engine.
1st Class Goods, Extra (E)	...	...	...	£1,700 per engine.

Mr. A. Morris, Executive Commissioner (to the Colony of New South Wales) to the Philadelphia International Exhibition of 1876, reported to his Government that American engines of the very best quality could be laid down in Sydney for £2,000, or £1,000 less than for those contracted for in England. Mr. Allison D. Smith, the Locomotive Superintendent of the Government railways of New Zealand, wrote on the 29th March, 1878, as follows, in reference to the American engines which Mr. Evans had sent out to that Government: "The engines or 'Yankees,' as they are called here, are working splendidly; they have given great satisfaction. I have picked out our best men for them, and they are great favourites. When I let it be known that six more were coming, the drivers and firemen all commenced to vie with each other in trying who should be best man in order to get one. The engines, being new, are somewhat stiff, but I can plainly see that they will be economical in stores, and light in repairs."

Now, if the best American engines can be laid down in India and in our colonies as cheap or cheaper than English engines, and that they will run easier and with greater steadiness, involve less expense in repairs and renewals, and do less damage to the permanent way, it is surely worth while for consulting engineers, directors, and agents to consider the economy their introduction must occasion.

At the same time I must say it would be better if they were never ordered than to place them at the disposal of any prejudiced or narrow-minded superintendent, who would be sure to injure them and give them a bad name, as was done in South America. In the hands of an intelligent and liberal-minded superintendent, I am confident they will prove far more effective and economical than our Indian and colonial experience has hitherto found to be possible with English engines.

The two best and most reliable locomotive firms in the United States are the Rogers Locomotive and Machine Works and the Baldwin Works. Both have immense establishments, tools, and appliances for turning out with the greatest expedition a large number of engines, surpassing any similar establishment in this country. The former firm are noted for their care in packing their engines for export, so that their engines always arrive in excellent condition and free from rust. Mr. W. S. Hudson, the superintendent of the works, is an Englishman by birth, and as a lad was brought up on the Stephenson's works at Newcastle. He is now recognized as the ablest locomotive-builder in the United States, and he is as good a master of natural and mechanical sciences as can be found in America, although almost self-taught.

The Baldwin Works have a more extended reputation than the Rogers, for they have agents and travelling partners everywhere, and their engines are excellent; but it is admitted by all the best experts with whom I have come across that those engines which are built under Mr. Hudson's own eyes and which have his brains on them are superior to all others.

I am surprised to find how slow we are in this country, in India, and also in our colonies, in adopting the Westinghouse automatic brake, the Miller's coupling and buffer to passenger carriages, which entirely prevents telescoping in collision, and the cast-iron chilled wheel made of the Salisbury iron of Connecticut, all three of which railway appliances are now in general use in the United States. In my judgment no railway train can be *safely* worked in these days without the Westinghouse brake, and to pause in adopting it simply because of the possibility of something better being discovered is no valid reason, while the lives of passengers and valuable property are in daily jeopardy. It should be remembered, on the principle that "the proof of the pudding is in the eating," that the Americans are the most experienced railway managers in the world, as they have upwards of 74,000 miles in daily operation, 3,000 miles of which are narrow-gauge lines, and that on the majority of their roads these three railway appliances are adopted and have been in use for years. I believe if we adopted the use of the cast-iron chilled wheel we should effect an immense saving. These wheels have a life of 100,000 miles, and cost only £3 10s., as against £7 to £9 the cost of the English steel-tired wheel. The weight of a wheel for a passenger carriage is about 525 lb. The metal is charcoal iron, having a tensile strength averaging 14 tons per square inch. When you compare the life and first cost of these wheels with those you have in use in this country, in India, and in the colonies, I think you must be struck with the financial importance of the result.

Another most useful and handy machine in general use in America, especially on the Western prairies, where fuel is scarce, is the Corcoran wind machine for pumping. I think it is the most perfect wind motor ever invented. It is used in connection with cedar tanks, holding from 50,000 to 150,000 gallons, for supplying the engines. The machines are entirely automatic. They set themselves to the wind, and turn their face from it when it blows too hard; they can be regulated to any strength of wind, and will work in the lightest zephyr.

The cedar tanks, if properly covered, last fifty years and upwards. By soaking the staves in silicate of soda, and then in chloride of calcium, they can be made to last for a very long period.

In India we have only about 7,000 miles of railway to a population of about 200,000,000. In the United States they have 77,470 miles to a population of 45,000,000. The railways in the United States have cost on the average for construction and equipment about £12,000 per mile, and some of