

Wood added wrought iron tires to the driving-wheels, the locomotive remained for many years in the condition to which Stephenson had brought it.

We have thus briefly noticed the progress of locomotives, in order to show the state of utility to which they had been brought when Robert Stephenson returned to England, in 1828. When he departed for America, in 1824, there were very few locomotives in existence, and during his absence, no very important improvements had been made, except that Mr. Hackworth, of the Stockton and Darlington Railway, had introduced the blast-pipe, (as it had been formerly applied by Trevithick,) into an engine constructed for that line, which had six coupled wheels, and was capable of drawing a gross load of 100 tons, on a level, at the rate of five miles per hour.

During the same period, however, a new era had commenced in the history of railways. They had received an impetus from the increasing success of the locomotive. The Stratford and Moreton line had been opened for the carriage of goods and passengers,—the Stockton and Darlington was opened soon after; and, notwithstanding the commercial panic and the difficulties which had to be overcome in Parliament, the Liverpool and Manchester line was commenced in 1826, under the unconquerable energies of the elder Stephenson, and his assistant, Mr. Joseph Locke. Mr. Nicholas Wood had also published his well-known "Practical Treatise on Railroads," in 1825,—and, in that year of the wildest speculations, the idea of iron highways and rapid travelling by steam first seized upon the public mind. On the return of Stephenson to England, in 1828, he found the Liverpool and Manchester Railway rapidly approaching completion, and a general desire on the part of the public for a higher rate of speed than had yet been attained. The Directors of the Liverpool and Manchester Railway, in consequence of this feeling, and of the non-existence at that time of locomotives capable of meeting the public requirements, seriously contemplated working their road by stationary engines. Previous, however, to deciding this important question, a commission consisting of Messrs. George Stephenson, Locke, Walker, and Rastrick, was appointed to collect information from the managers of the few railways and tramroads then in existence, as to the best power that could be applied, and more particularly as to the comparative merits of fixed and locomotive power. The result of their report showed a proportion of seven to nine in favour of stationary power.

As, however, it was admitted that several improvements were being made in locomotives, the Directors, influenced by the opinions of their Engineer, and by the careful reasonings of a pamphlet, the joint production of Robert Stephenson and Joseph Locke, determined, at the suggestion of Mr. Harrison, one of their number, to offer a premium of £500 for the best locomotive which should conform to certain conditions, namely,—It must consume its own smoke;—the whole weight of the engine and boiler must be carried on springs;—it must not exceed six tons in weight;—if of that weight it must be able to draw a train of twenty tons, including the tender, at the rate of ten miles an hour on a level railway;—if of greater than  $4\frac{1}{2}$  tons weight, it must

have six wheels. The conditions also announced that an engine of less weight would be preferred, if it performed an equal amount of work.

The local growth of railways and the sudden impulse given to them in 1825, together with the several patents held by George Stephenson in connexion with locomotives, had been the means of causing his steam-engine manufactory at Newcastle to become exclusively a locomotive manufactory; and to it, during a space of three years after his return from America, Robert Stephenson devoted the greater part of his time,—having charge, however, during the same period, of the construction of the Warrington and Newton and of the Leicester and Sawamington Railways. During this period, as we have seen, the nature of the power to be used on the Liverpool and Manchester line had to be determined,—and Robert Stephenson at once entered into the competition, resolved to outstrip the conditions imposed upon the competitors.

(To be continued.)

Address of the President and Council of the Canadian Institute to Mr. Robert Stephenson, M.P., on the occasion of his Visit to Toronto.

TORONTO, UPPER CANADA, }  
August 26, 1853. }

To Mr. Robert Stephenson, M.P.,—

SIR,—We, the President and Council of the Canadian Institute, take the earliest opportunity to offer you a most cordial welcome to Upper Canada, on behalf of a Society which has for one of its main objects the cultivation of that branch of Science with which your name is so honorably and eminently connected.

Our Institute, founded in 1849 by Royal Charter, for the promotion of the interests of Science and Art in this Province already numbers nearly 300 members, including the most distinguished Scientific and Literary names in both sections of Canada. We have endeavored to carry out our object by holding winter Sessions, in which papers are read and discussion encouraged; and by the establishment of a monthly Scientific Journal, to serve as a record of the transactions of the Institute, and which, though only just completing its first year of existence, has already a circulation of about 500.

Of a copy of this we beg your acceptance.

We are also successfully engaged in forming a Library of Scientific reference, and a museum illustrative of the productions of the Province.

Such being our aims, and the progression we are making towards their attainment, we beg to hope that you will allow yourself to be nominated an honorary member of the Institute,

And we have the honor to be,

With the greatest respect and esteem,  
your obedient servants,

The President and Council of the Canadian Institute.

Signed in behalf of the Council of the Canadian Institute.

J. B. CHERRIMAN, M. A.  
Vice President.

FRED. CUMBERLAND,  
Second Vice President.

A. BRUNEL, Secretary.

Mr. STEPHENSON in reply, expressed the deep gratification he had received from the extremely kind welcome he had met with